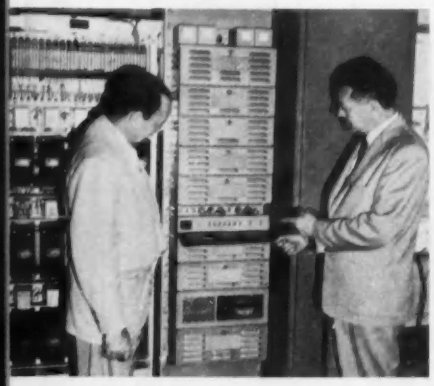
ELECTRICAL WEST

August 1955
25 Cents

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED REGION OF THE U.S.



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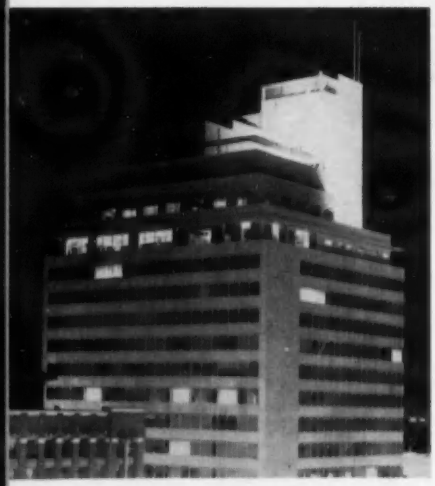

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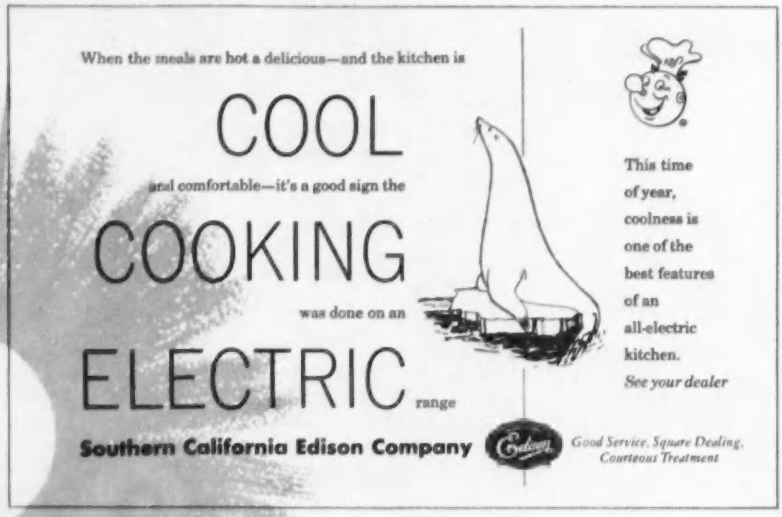
where cooler heads prevail!

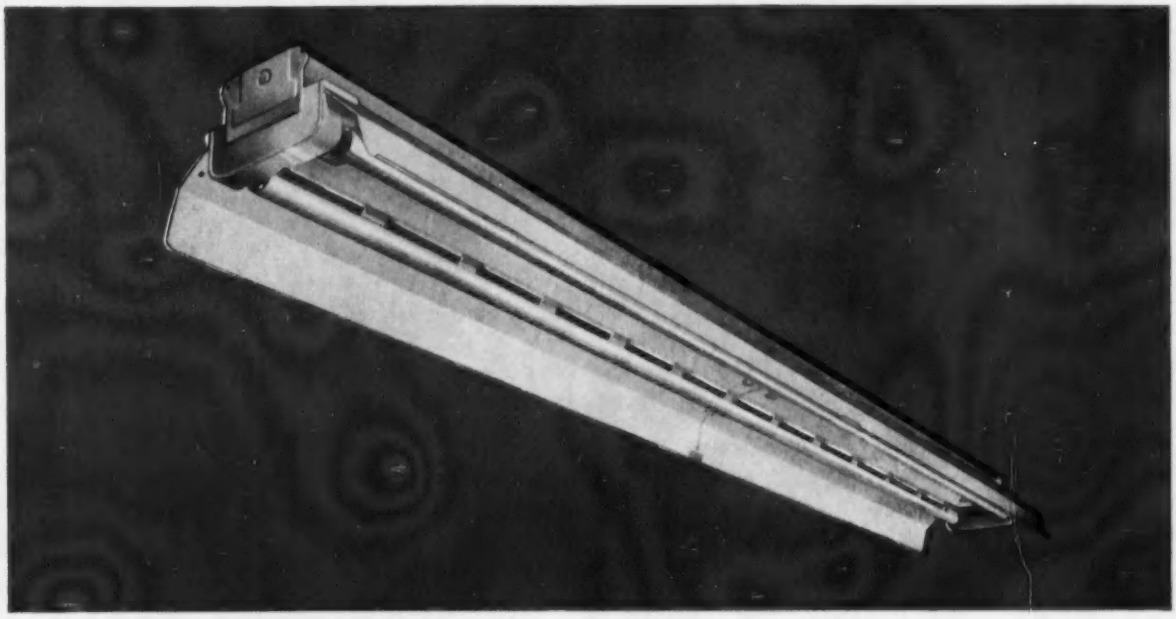

When the meals are hot a delicious—and the kitchen is
COOL
and comfortable—it's a good sign the
COOKING
was done on an
ELECTRIC
range
This time of year, coolness is one of the best features of an all-electric kitchen.
See your dealer
Southern California Edison Company
Good Service, Square Dealing, Courteous Treatment

weather hot?
so what! You can spare yourself without spoiling the menus... by cooking the one really cool way: on an electric range! See your dealer.
The cold fact is that an electric home food freezer lets you buy when stocks are full, quality is high and prices are low.
Good Service, Square Dealing, Courteous Treatment
Southern California Edison Company

There's a winning combination featured in Edison newspaper advertising during the summer months: hot meals and cool cooks. The advertisements emphasize that both are most likely to be found in kitchens where the cooking is done electrically.

It's a fact — and if we make it clear, the result will be thousands of happier homemakers. Not to mention all the happier appliance dealers who ring up the sales of electric ranges. In Central and Southern California *this* has been a winning sales combination for over half a century: *Edison tells them, and the dealer sells them!*

Southern California Edison Company



Patent pending.

SMOOT-HOLMAN *scores again!*

A GREAT NEW INDUSTRIAL LUMINAIRE

New metal clad depressible type lamp holders. Improved reflector latches. Upward illumination, Type D 12% with 13° shielding; Type SD (not illustrated) 24% with 27° shielding. Built in compliance with new RLM standards. Extra sturdy for long hard use. Lifetime porcelain enameled reflector for easy cleaning and high efficiency.

Write for Literature "D"

We support The National Lighting Bureau

SMOOT-HOLMAN COMPANY

INGLEWOOD, CALIFORNIA

ELECTRICAL WEST

SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S.

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Next Month

September is the special lighting issue. Pictures and description will cover fluorescent street lighting, school, industrial and commercial, golf driving course lighting and garden lighting. This is always an outstanding issue.

In engineering there will be articles on vacuum switch installation for 138-kv line dropping, weed control, bin material storeroom plan, a new more economical type of substation structure and a new hydro plant.

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ELECTRICAL WEST (with which is consolidated The Journal of Electricity). AUGUST 1955. Vol. 115, No. 2. Published monthly by McGraw-Hill Company of California. **Publication office, 1111 Wilshire Blvd., Los Angeles 17, Calif. Executive, Editorial and Advertising Offices: 68 Post St., San Francisco 4, Calif.** James H. McGraw (1860-1948), Founder; Donald C. McGraw, Chairman of the Board; George C. Tenney, President; John W. Otterson, Vice-President; B. M. Baccali, Secretary and Treasurer. **Subscriptions: Address correspondence to Electrical West—Subscription Service, 68 Post St., San Francisco 4, Calif. Allow 30 days for change of address. Please indicate position and company connection on all subscription orders.** Single copies 25c. Subscription rates—U. S. possessions and Latin American Republics: $2 a year, $3 for two years, $4 for three years. Canada $2.50 a year, $5 for three years. All other countries $3 a year, $5 for two years, $6 for three years. Entered as second class matter April 17, 1947, at the post office at Los Angeles, Calif., under the Act of March 3, 1879. Printed in U. S. A.

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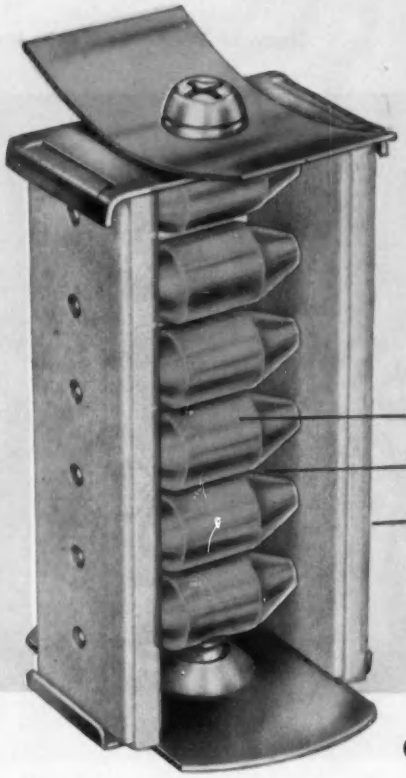
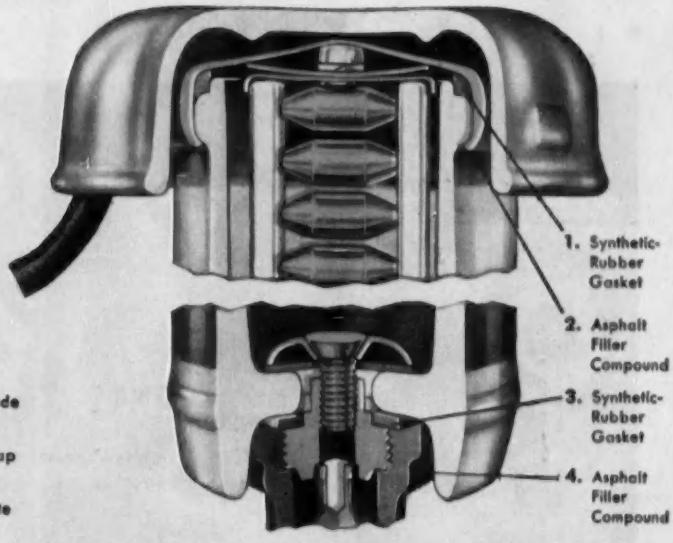


L-M's precision spark gap structure is made of electrode members accurately spaced and supported by a frame of high-grade steatite.



Permanently Sealed, L-M's spark gap cannot be knocked or burned out of adjustment. Not affected by weather, corrosion, birds, bugs, etc.

Cannot get out of adjustment...

L-M's Valve Arrester Gap Pre-Set, Sealed, To Assure Unchanging Characteristics

By **ROBERT W. KELLY**
Application Engineer
Protective Equipment
Line Material Company

You can always be sure of optimum balance between 60-cycle sparkover and impulse sparkover with L-M's Valve Type Arrester.

L-M's spark gap is precision made, preset, and then permanently sealed in the arrester housing. It cannot be knocked or burned out of adjustment. It is not affected by weather, corrosion, birds, bugs, etc. The sealing prevents corrosion, and thus prevents radio noise.

Gap of Heavy-Duty Construction

L-M's spark gap structure is a ladder gap design, made of solid brass electrode members. These are accurately spaced and supported by a frame of high-grade steatite. This heavy-duty unit transmits severe discharges without burning or pitting, and allows the arrester to go into action fast.

Permanently Sealed At Each End

The arrester is sealed at the top by a heavy synthetic-rubber gasket between the copper cap and the seat on the housing. The cap is spun onto the glass housing while pressure is applied to compress the gasket.

The bottom of the arrester is also sealed by a heavy synthetic-rubber gasket which is compressed against the glass seat by the Isolator assembly.

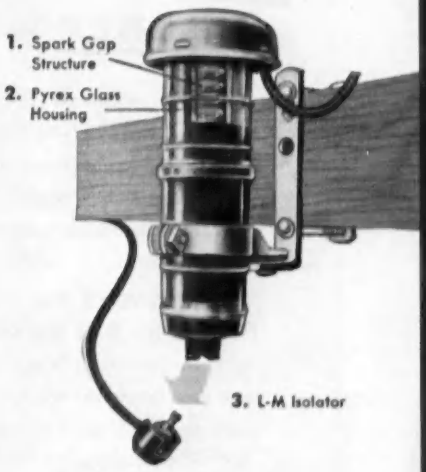
100% Tested For Positive Sealing

All of L-M's Valve Arresters are tested by applying air under 15 pounds pressure, while the arrester is submerged in water, to see whether any bubbles appear, indicating air leaks. Since the valve material is porous, this air-pressure test checks the gaskets at both ends of the arrester.

Visual Testing In The Field

Should the spark gap ever become damaged by any cause, permanent telltale evidence can be readily seen through the Pyrex glass housing. If the valve element is damaged and the spark gap fails to extinguish 60-cycle power follow current, the heat from the additional current across the Isolator gap explodes a small charge of non-aging gunpowder, which is permanently sealed in the Isolator.

This ruptures the Isolator housing and blows the ground lead terminal free, giving complete isolation and ready identification of the faulty arrester.

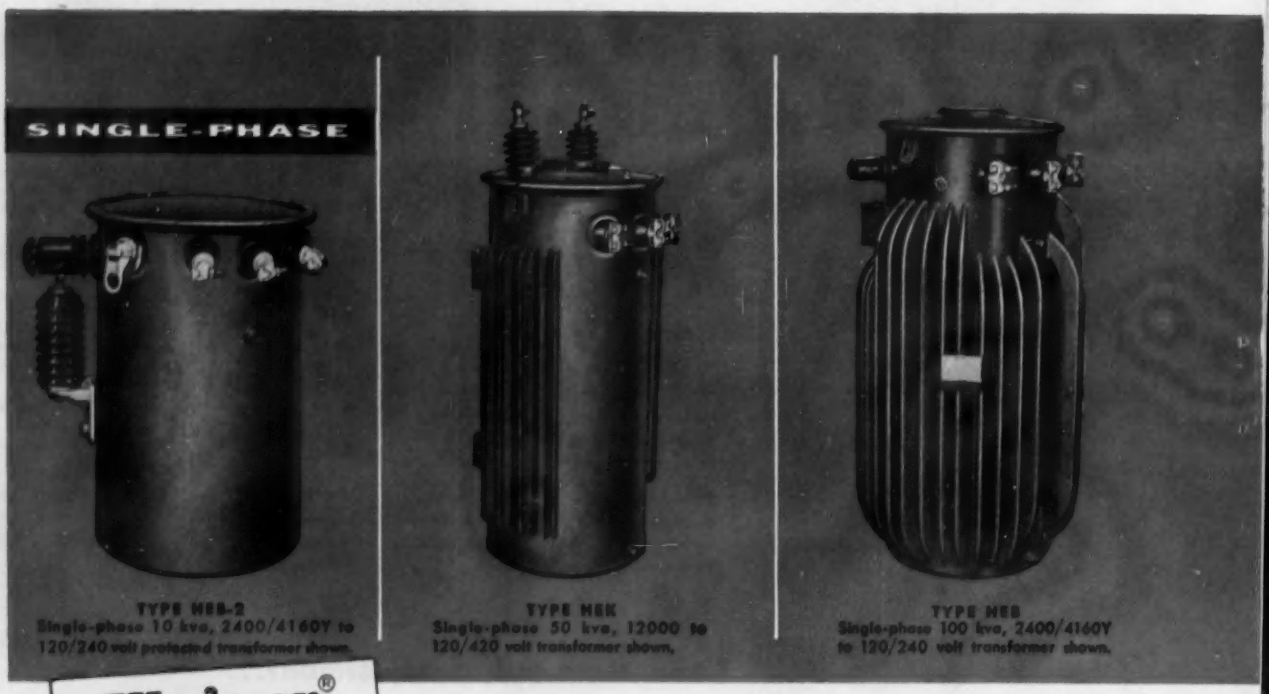


Ask For Complete Information

Ask the L-M Field Engineer for Bulletin LA2 on L-M's Valve Arrester, giving specific information on arrester requirements, design and performance; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL 228

LM Lightning Arresters


SINGLE-PHASE
TYPE HSB-2
Single-phase 10 kva, 2400/4160Y to 120/240 volt protected transformer shown.
TYPE HSK
Single-phase 50 kva, 12000 to 120/420 volt transformer shown.
TYPE HSB
Single-phase 100 kva, 2400/4160Y to 120/240 volt transformer shown.

Wagner®
TRANSFORMERS
...the choice of leaders in industry

When it comes to

WAGNER WILL MEET YOUR REQUIREMENTS!

The Wagner line of Distribution Transformers, that meets *all* EEI-NEMA Standards—will also meet *all your* requirements, no matter how varied they may be. Wagner Distribution Transformers are available in all standard kva ratings and voltages.

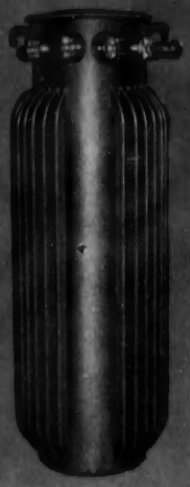
If you want a 3 kva, pole-type transformer—Wagner has it. If you want a 150 kva, vertical-type transformer, Wagner has it, too. But these are requirements more in the nature of specifications. We're sure you have *other* requirements for the transformers you buy—such as dependability . . . long service-life . . . maintenance-free performance. Setting high standards for quality materials and careful workmanship are *additional* requirements met by Wagner Distribution Transformers.

Then there are the *extra* features of Wagner Distribution Transformers . . . like the Wagner Shur-Seal Clamping Ring, the high voltage side-wall bushing, the locked low voltage bushing and the Wagner Form W element. *All* Wagner Distribution Transformers are filled with inhibited oil to reduce oxidation and retard the formation of acids and sludge.

You get quick delivery, too. Wagner's expansion program has provided a new plant, devoted exclusively to the manufacture of transformers, to help meet the growing demand for Wagner Transformers. In addition, Wagner has a nation-wide organization to provide fast, convenient service—with branches in 32 principal cities.

Get in touch with your nearby Wagner branch today. Write for your copy of Bulletin TU-180. It gives complete information on Wagner Distribution Transformers.

TYPE HPK
Three-phase 225 kva, 7200 to 240 x 480 volt transformer shown.



TYPE HPB (Vertical)
Three-phase 112.5 kva, 2400 to 208Y 120-volt transformer shown.

THREE-PHASE

TYPE HPB
Three-phase 75 kva, 2400 to 240 x 480 volt transformer shown.

Distribution Transformers...

HIGH VOLTAGE SIDEWALL BUSHING

This high voltage sidewall bushing permits *faster* connections because the conductor is simply pushed into the connector and tightened with a few turns of the knob... *easier* because no tools are needed... are *safer* because the knurled knob is insulated to protect the lineman from accidental shock.

LOCKED LOW VOLTAGE BUSHING

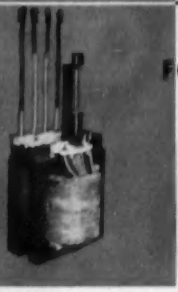
These bushings are keyed to prevent rotation. The porcelain is keyed to the tank and the metal stud is keyed to the porcelain. There can be no loose connections on the inner end of the terminal studs because it is impossible for these studs to turn when the terminals are being tightened.

SHUR-SEAL COVER

Covers of pole-type transformers with round tanks are sealed to the tank with the Wagner Shur-Seal Clamping Ring. "Breathing" is completely prevented and no loss of oil can occur at any time. The Shur-Seal ring maintains equal pressure all around the cover—yet the cover may be easily removed by loosening a single, stainless steel bolt.

Wagner FORM W ELEMENTS

All Wagner single-phase distribution transformers in ratings 500 kva, 15 kv and below, are furnished with Wagner Form W core and coils which permit a liberal design in small size, lightweight transformers and which give excellent electrical performance.



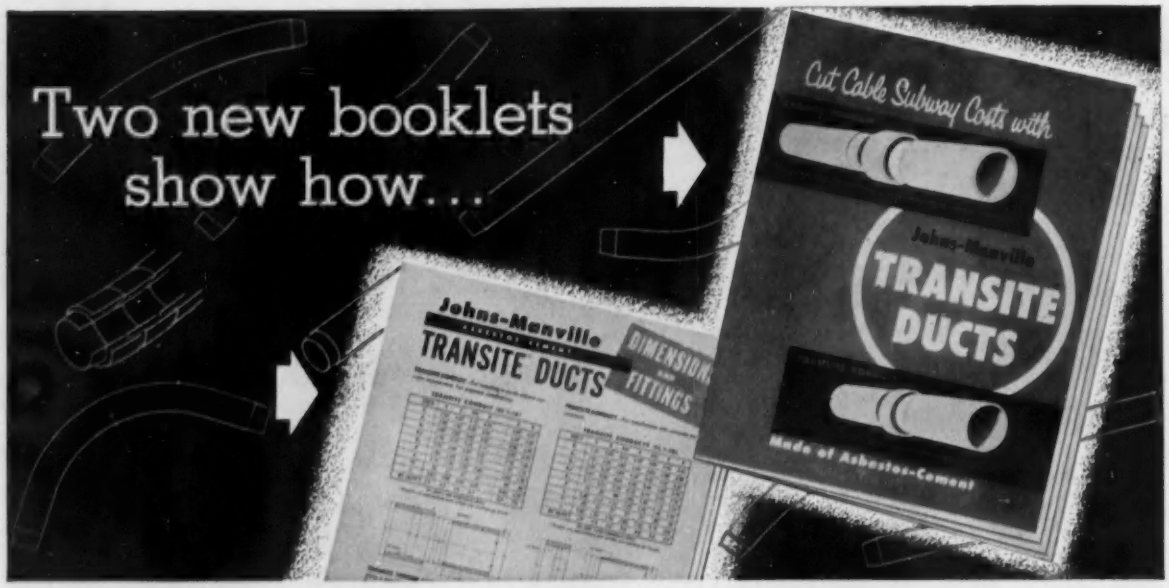
T59-4

WAGNER ELECTRIC CORPORATION
6381 Plymouth Ave. • St. Louis 14, Mo., U. S. A.

Wagner Electric Corporation EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES



Transite® Ducts cut cable subway costs—

give greater cable protection

Transite Conduit is the thicker walled duct which is used for exposed work or is laid directly in earth without a concrete encasement. Saves time, labor and materials on the job

Transite Korduct® is the thinner walled duct for installation in concrete. Inasmuch as it is used principally for hi-voltage lines, its high thermal conductivity reduces operating losses

• Johns-Manville presents these brochures as a service to public utilities, design engineers, and all other users and planners of cable subway systems. "*Transite Ducts*" shows how improved cable subway protection, installation, maintenance and operational savings may be achieved. "*Transite Ducts, Dimensions and Fittings*" give the necessary dimensional data on all ducts and fittings.

Transite Ducts offer improved cable subway protection. Made of asbestos and cement, Transite cannot burn, smoke, fume or generate explosive gases. Transite confines arc damage and protects adjacent cables against heat and flame. Transite resists corrosive action of soils; is unaffected by electrolysis.

Installation savings result because Transite is strong, light in weight, easy to handle. It comes in long, 10-foot sections, thus, fewer joints are required. Its permanently smooth bore prevents injury to cable either from natural movement or when pulling cable through. Maintenance savings result from the permanent nature of the asbestos cement composition of Transite. It is as durable as stone.

Moreover, operational savings result because cables run cooler due to the high thermal conductivity of Transite Ducts. This also results in prolonged cable insulation life.

For complete details on how Transite Ducts can cut cable subway costs for your system, send for copies of "Transite Ducts," EL-29A and "Dimensions and Fittings," EL-45A. Write to Johns-Manville, Box 60, New York 16, New York. In Canada, 199 Bay Street, Toronto 1, Ontario.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

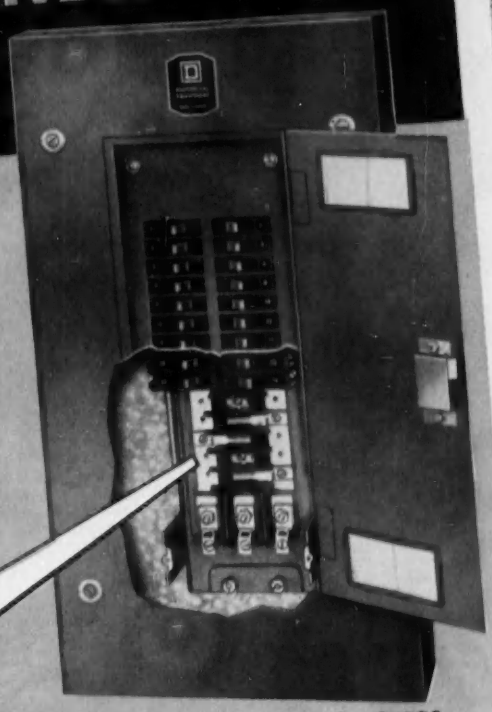
TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

Terrific!

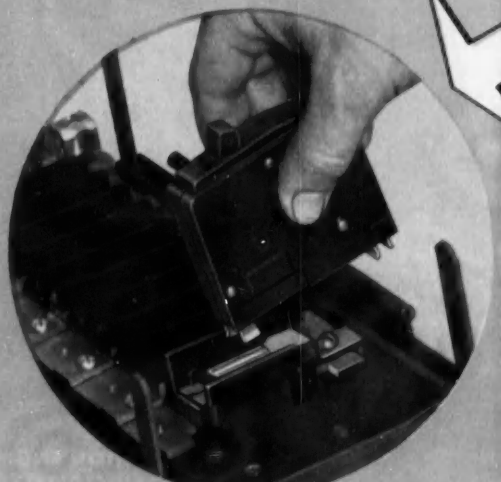
NQO LIGHTING PANELBOARD

with QO... FINEST BREAKER EVER BUILT!



...Get the complete line "Off-the-Shelf" from your Electrical Distributor or have assembled panels shipped right to the job

It's a top quality line throughout! Note the compact, streamlined beauty. A closer look reveals such outstanding features as: Distributed phase bus arrangement with clear identification for simplified load balancing. Adjustable, indicating trim clamps. Galvanized box with large gutters for real accessibility, yet compact enough to mount between 16" wall studs. Most important of all—the new NQO panelboard offers you the finest breaker ever built, with exclusive SWINGRIP mounting.



NEW QO BREAKER
with Exclusive SWINGRIP mounting

No other breaker has all these features which make QO the finest breaker ever built!

- Plug-In for maximum flexibility as well as ease of installation and maintenance.
- Quick-make, quick-break mechanism provides positive operation, has excellent "feel". Assures positive operation and long life under all circuit switching conditions.
- Compensated thermal trip enables breaker to carry full allowable load under varying ambient temperatures.
- Sensitive calibrated magnetic trip assures quick and consistent response to harmful overloads or short circuits.
- Non-interchangeable design discourages the use of 30, 40 and 50 ampere units where 15 or 20 ampere breakers have been installed.
- Trip indication on overload or short. Handle moves to middle position.
- Positive action of handle against contact members guarantees circuit opening.
- Compact design—¾" width for each pole conserves valuable space.
- Exclusive SWINGRIP mounting provides easier installation, automatic alignment, positive contact with bus bars.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

DISTRIBUTION
TRANSFORMERS
ATANA*

2. G-E SERVICE SHOPS—
MORE THAN 30 LOCATIONS

1. ENGINEERING HELP—
SALES & APPLICATION ENGINEERS,
TRANSFORMER SPECIALISTS

3. REPLACEMENT PARTS—
FOR UPRATING OR REBUILDING

4. G-E WAREHOUSES—
45 STOCKING POINTS

Four areas which show that

SERVICE HELP IS AVAILABLE

Here's the kind of help available with every General Electric distribution transformer you buy:

Engineering help. Sales and application engineers, transformer specialists are available to every customer. Highly trained, these men can provide valuable assistance in your planning or day-to-day problems.

G-E service shops—31 throughout the country—are as close as your telephone. They are ready to help you in any emergency or to give routine service in your maintenance program.

Replacement parts permit uprating or rebuilding. Whether it's a complete core-and-coil or just a broken part, G.E. is ready to help you. We can furnish the parts or do the whole job.

G-E warehouses. 45 easy-to-reach places where thousands of G-E transformers are stocked. You can get off-the-shelf delivery of almost all standard ratings. 431-24

*ATANA. When you need service, remember *All Transformers Are Not Alike* and go where the help you need is always available. General Electric Company, Schenectady 5, New York.

CONVENTIONAL—SELF PROTECTED
take your choice
General Electric makes both

Progress Is Our Most Important Product

GENERAL ELECTRIC

O.Z. pull boxes

SAVE TIME! SAVE SPACE! SAVE MONEY!

The easiest, most economical way to speed installation of conduit—of any size from ½" to 6"—is to use O. Z. Pull Boxes. Two hot dip galvanized malleable iron units fitted to an oversize length of pipe replace the conventional, bulky and costly pull box . . . cuts labor time in half!

O. Z. Pull Boxes are available in four designs: standard (Type "PB"); weather-tight (Type "PBW"); explosion proof and thin wall conduit. The oversize sleeve can be cut to required length "on the job" from standard conduit, or furnished to your specifications by O. Z.

Call your local O. Z. distributor, or write direct to the company for complete information.

1. Slide head "A" with sleeve over the conduit end. Attach head "B" on opposite conduit.

TYPE "PBW"

2. Simply pull cables, loop and feed back into oversize sleeve. Slide head "A" with sleeve into position and screw sleeve into head "B". Tighten set screws to lock "A" in position.

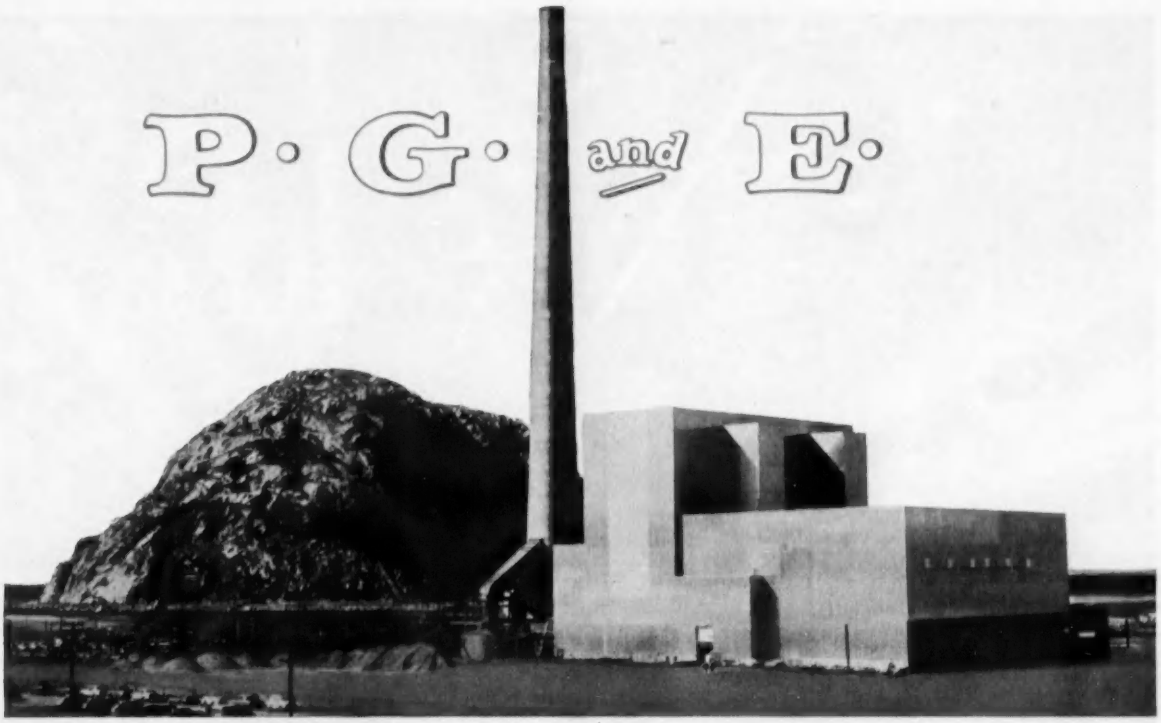
O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND STREET · BROOKLYN 17, N. Y.

San Francisco Plant: 501 Indiana Street, MArket 1-4709

CAST IRON BOXES
CABLE TERMINATORS
POWER CONNECTORS
SOLDERLESS CONNECTORS
GROUNDING DEVICES
CONDUIT FITTINGS

P. G. and E.



SALT WATER STEAM

Literally powered by "ocean steam," Pacific Gas and Electric Company's new 300,000 kilowatt Morro Bay, California generating station is the first to use evaporated sea water in its boilers.

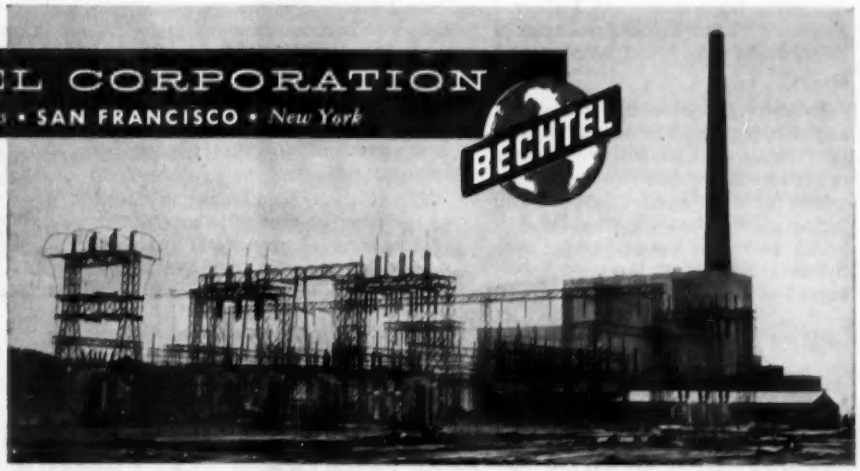
Because it was the most economical solution to providing a volume source of fresh water, PG&E and Bechtel engineers designed an evaporating system that removes salt and minerals from Pacific Ocean water. In two stages the salt and mineral content is reduced from 36,000 parts per million to 1 part per million.

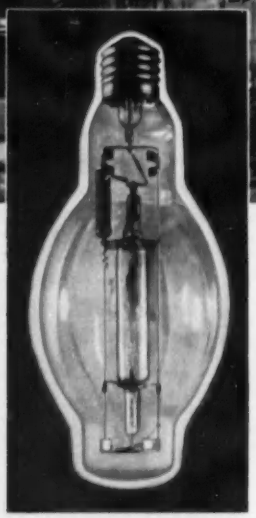
This solution of a difficult problem illustrates close teamwork between the utility company's staff and that of the engineer-constructor—a working relationship maintained from site layout through construction to commercial operation.

BECHTEL CORPORATION

Los Angeles • SAN FRANCISCO • *New York*

BUILDERS FOR INDUSTRY





Now you can have both!

✓ The high efficiency of Sylvania Mercury Vapor Lighting

✓ Improved COLOR as well

If you have been hesitating about installing high-efficiency Sylvania Mercury Vapor lighting because of its inherent color—you need wait no longer!

Sylvania phosphor-coated mercury vapor lamps, used in standard mercury vapor circuits, will give greatly improved color rendition that is adequate for most applications. If still better color is needed, combine Sylvania mercury vapor lamps with Sylvania fluorescent lamps in lower-mounted fixtures—up to 40 or 50 feet. For high mounting heights, combine Sylvania mercury vapor with Sylvania incandescent lamps.

When you combine mercury vapor with fluorescent or incandescent lighting, you gain another important advantage, too . . . greater protection in the event of momentary power interruption.

So . . . there is no longer any need to hesitate because of *color*. Get the real economies that only mercury vapor lighting can give you—*plus* improved color through Sylvania phosphor-coated lamps or regular high-output Sylvania mercury vapor lamps in combination with Sylvania fluorescent or incandescent.

Sylvania's Lighting Engineering Department will gladly help you plan your mercury vapor installation. For complete information and application data, write to:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.,
University Tower Building,
St. Catherine Street, Montreal, P. Q.

SYLVANIA®

...fastest growing name in sight

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

ALLIS-CHALMERS
NETWORK
TRANSFORMERS

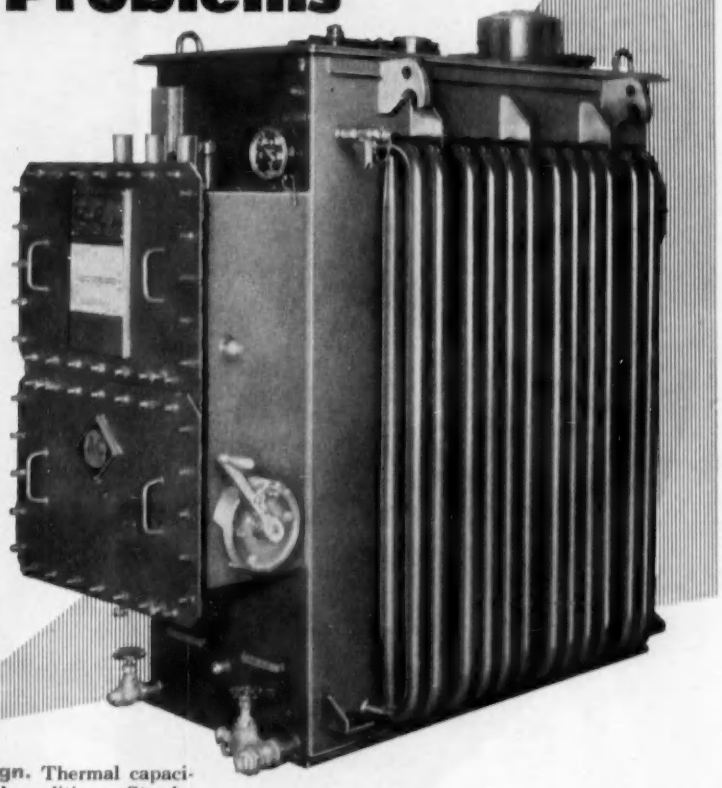
Space-Saving Solution To Network Problems

COMPACT design means savings in high-cost space when you use Allis-Chalmers network transformers. Utilities all over the country are choosing Allis-Chalmers as increasing loads put more demands on their downtown network systems. New Allis-Chalmers units are ordered repeatedly to take their place alongside the more than 1½ million kva already installed.

You get unusual flexibility in choice. To simplify application problems, Allis-Chalmers builds all three types: oil-filled, *Chlorextol* liquid-filled, and sealed dry-type.

Investigate all the advantages of compact, reliable Allis-Chalmers network transformer design. Consult your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4781

Chlorextol is an Allis-Chalmers trademark.



Compact, low-loss design. Thermal capacities are high for severe load conditions. Sturdy, time-proved core and coil construction withstands repeated short-circuit stresses of network operation.

Safe, dependable tap-changing mechanism. Handle inserted through two-inch opening on cover operates mechanism. Handle cannot be removed unless it is in positive tap position. Cover location of handle entrance eliminates packing gland maintenance.

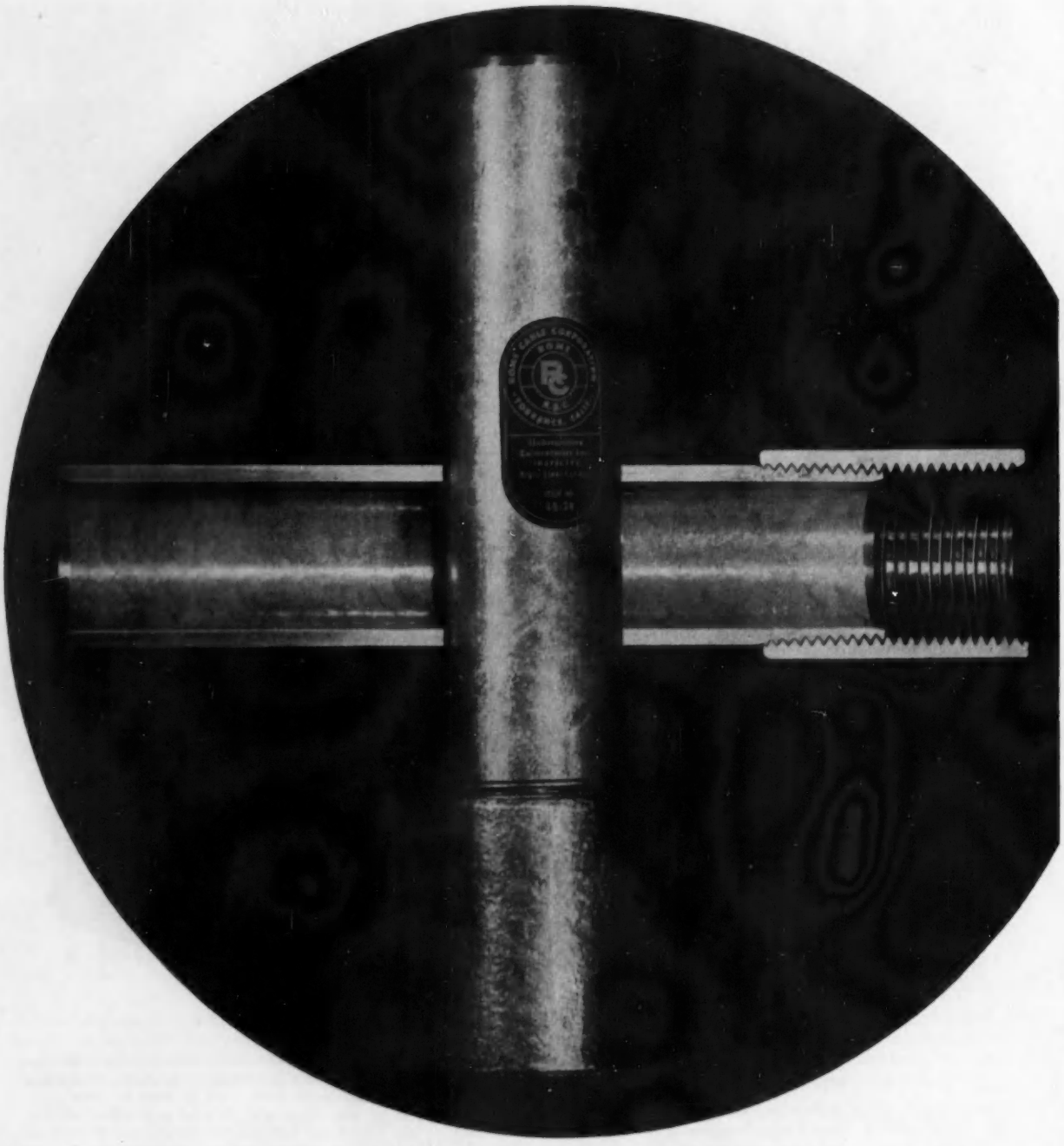
Threaded valve connections to tank are solder-wiped for extra protection. Valves are located for easy access. Globe-type valves with nonrotating seats close tight, avoid wear on valve seats.

Spiral-wound gaskets have proved their superiority over other types of gaskets for sealing bushings in the tank wall in over 7 years' continual use. Alternate plies of preformed spring-like metal and nonmetallic fillers provide unusual resilience and actually adjust themselves to changes in operating conditions. Gaskets can be installed without cements or grease. They can be quickly removed if required and may be re-used.

Shot blast cleaning, three coats of baked-on paint formulated for high water resistance, and protective compound treatment of base and tubes in base area give superior surface treatment.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



Cutaway section of Rome • Rigid. Rome • Rigid is threaded to give you fast, easy coupling connections in assembly.

You get corrosion-free protection from Rome • Rigid's hot-dip galvanized coating. It takes bending and rebending without flaking.

Rome • Rigid is stocked at Torrance, California, for immediate shipment in sizes ½" to 6".

INSIDE AND OUT

the finish of Rome • Rigid means lower installation costs

Because that's where your cable goes, it's important that the inside of your conduit be smooth. There should be no burrs, no flash, no rust, no finish that flakes—just a smooth surface.

That's what it's like inside Rome • Rigid. As a matter of fact, it's like that on the *outside*, too. And it stays that way.

There are a number of reasons why Rome • Rigid is so smooth. First, it's made from hot-rolled sheet steel, shot blasted on both sides to remove all dirt, rust and roughness.

Then, it's cold formed, thereby maintaining uniformity of wall thickness and strength and electric resistance welded into a strong pipe of uniform diameter and surface quality. A scarfing tool removes any weld flash, inside and out.

The exclusive Sendzimir hot-dip galvanizing process, which follows, gives Rome • Rigid a bright annealed oxide-free surface. First, a flame preheater, with carefully controlled atmosphere, burns off dirt, oil or scale. Next a reducing furnace completely anneals the pipe, making it soft and ductile; and the blue oxide surface left by the flame preheater is reduced to a mirror-smooth, clean finish, free of stains.

From the reducing atmosphere of the furnace, the conduit goes directly into the zinc bath without temperature variation or chance of oxidation. A steam wipe removes excess zinc.

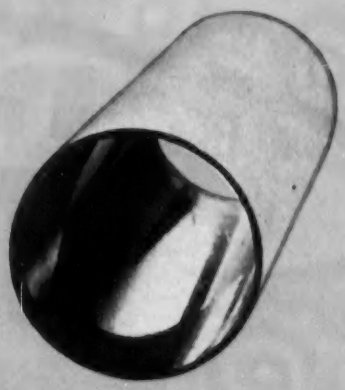
Bending without flaking • This results in conduit zinc so bonded that it will take an unbelievably high degree of distortion and bending with complete absence of flaking.

A smooth, easy-to-fish inside finish • You get conduit with a slick, low-friction inside finish that's easy to fish, easy on your cable.

Production is quality controlled at every step, giving you a rigid conduit that's easy to work with when you buy Rome • Rigid. Smooth inside for trouble-free pulling. An outside finish that can take bending and rebending without flaking. Find out for yourself why Rome • Rigid is the favorite heavy-wall steel conduit in the West.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA



THINWALL CONDUIT

Rome • EMT is a superior electrical metallic tubing, electrically welded for extra strength. It *is easier to fish than any other EMT on the market today* because of its sparkling new inside finish. The exterior finish is new also: a Rome process which not only combats corrosion but looks smooth and clean as well. Mirror-smooth inside—clean, smooth and neat appearing outside—Rome • EMT is an outstanding value. Compare it for yourself against *any* other EMT on the market.

Rome • EMT is immediately available in sizes ½" through 2" from the following warehouse locations:

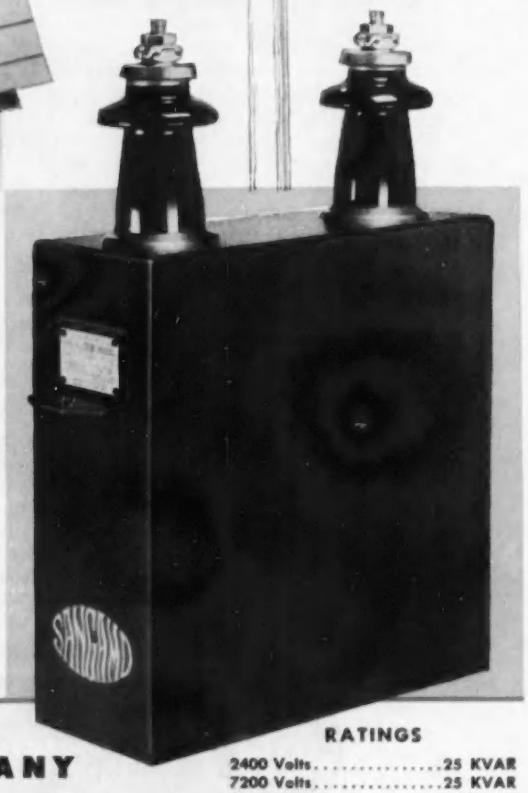
Atlanta, Ga.
Chicago, Ill.
Dallas, Texas
Denver, Colo.
Kansas City, Mo.
Los Angeles, Calif.
Rome, N. Y.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
St. Paul, Minn.
Torrance, Calif.

Designed and built to specifications you might have written . . .

Power Capacitor Specifications

1. Corrosion protection - even * though case finish is scratched.
2. Solder-sealed porcelain bushings.
3. Reliable performance at low ambient temperature.
4. Suitable for vertical or horizontal mounting.
5. Low losses.
6. Low temperature rise.
7. Stability under all operating conditions.
8. Terminal connectors for either copper or aluminum.

SANGAMO POWER CAPACITORS



* After many talks with utility company men, we know you want your capacitor in a case having corrosion resistance that's more than just skin deep. Sangamo Diaclor Power Capacitors have a case which is metalized with pure aluminum and finished with a two-coat, baked, vinyl resin base paint. Rust and corrosion won't attack this case even if the finish is scratched through to the steel. That's because the aluminum will "sacrifice" itself before rusting occurs.

For more details on other features of the new Sangamo Diaclor Capacitor, write today for Bulletin 1120.

RATINGS

2400 Volts.....25 KVAR
7200 Volts.....25 KVAR
Singlephase.....60 Cycles

SANGAMO

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

PC55-8

Check these features of SPANG® HD

HEAVY-DUTY HOT-DIPPED } GALVANIZED CONDUIT

...heavy-duty coating

SPANG HD (Heavy-Duty, Hot-Dipped) Galvanized Conduit is coated with prime western zinc plus an "insurance coating" of clear lacquer to produce the best heavy-duty finish on galvanized rigid conduit you can buy!

...high corrosion resistance

SPANG HD zinc coating is well in excess of the standard thickness of zinc required by Underwriters' Laboratories, Inc., and American Standards Association. This protection makes SPANG HD highly resistant to corrosion and white rust.

...uniform finish

SPANG HD is air-wiped as it is removed from the galvanizing tank to produce a smooth outside finish. Superheated steam blown through the interior of the conduit assures a sleek, uniform interior finish for easy wire pulling.

...strong bonding of finish

After air treatment, SPANG HD Galvanized Conduit is immediately quenched to prevent grain growth of the zinc coating. This assures a strong bonded finish that won't crack or peel under severest bending strains.

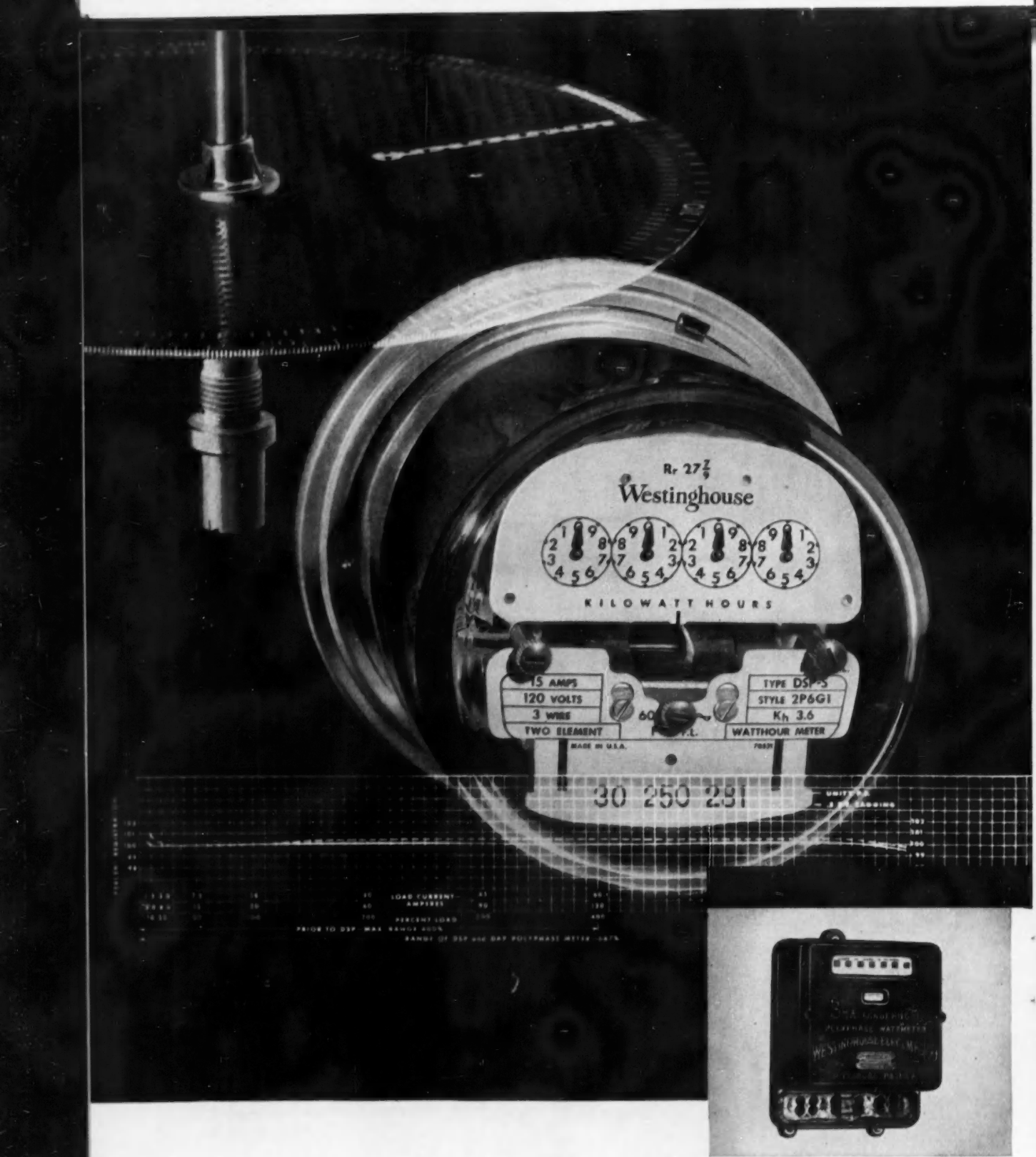
All this...and Quality-control, too!

Manufacturing factors such as controlled heat, controlled welding and controlled finishing produces in SPANG HD a strong conduit, easy to work with . . . makes it a top-quality conduit for top-quality installations. Try it on your next job!

Your local SPANG Distributor carries the complete SPANG line. Write to us for complete information and the name of your nearest SPANG Distributor.

SPANG® CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE
TWO GATEWAY CENTER, PITTSBURGH, PA.
District Offices and Sales Representatives in Principal Cities



1894 Induction Watthour Meter

Commercial measurement of a-c energy made possible by O. B. Shallenberger's invention of the first induction watthour meter. Discovery hastened success of a-c systems.

ANOTHER WESTINGHOUSE FIRST . . .

New single-disc design brings single-phase performance to polyphase meters

Once again Westinghouse brings you a significant advance in the science of metering—a polyphase meter of a basic new design. It provides the same outstanding performance characteristics found in single-phase watthour meters. This means that you can apply polyphase meters with the assurance that they will handle all present and future loads.

To give reliable single-phase performance to its DSP and DAP polyphase watthour meters, Westinghouse adopted the single-phase electromagnet in a single-disc-type construction. The new polyphase design is smaller than previous similar types, contains fewer parts. Result: it's easier to handle, install and maintain.

Here are some additional noteworthy features:

Accuracy—by unique design, new meter utilizes a single-phase disc and electrically eliminates interference between elements.

Extended range—gives straight-line accuracy up to 667% of rating to handle present and future loads.

Ease of calibration—only three adjustments—light load, full load and phase balance—readily accessible at front of meter.

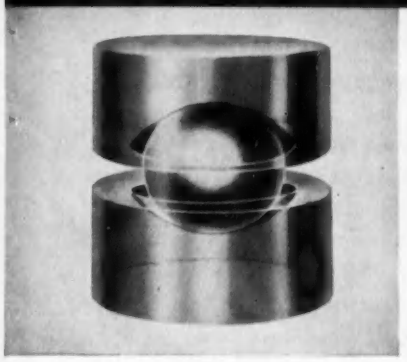
Built-in protection—co-ordinated materials minimize corrosion. Coil insulation raised to 10,000-volt impulse. De-ion® surge protection gaps discharge outside meter.

FOR MORE FACTS: Call The Man With The Facts... your Westinghouse sales engineer. Ask him for a copy of B-6398, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

J-40483

YOU CAN BE SURE... IF IT'S Westinghouse

METERING PROGRESS PIONEERED BY WESTINGHOUSE



1902 Ball and Jewel Bearing

Long-time accuracy was assured by stability of ball and jewel bearing assembly. This design has been proved by millions of meters in service.

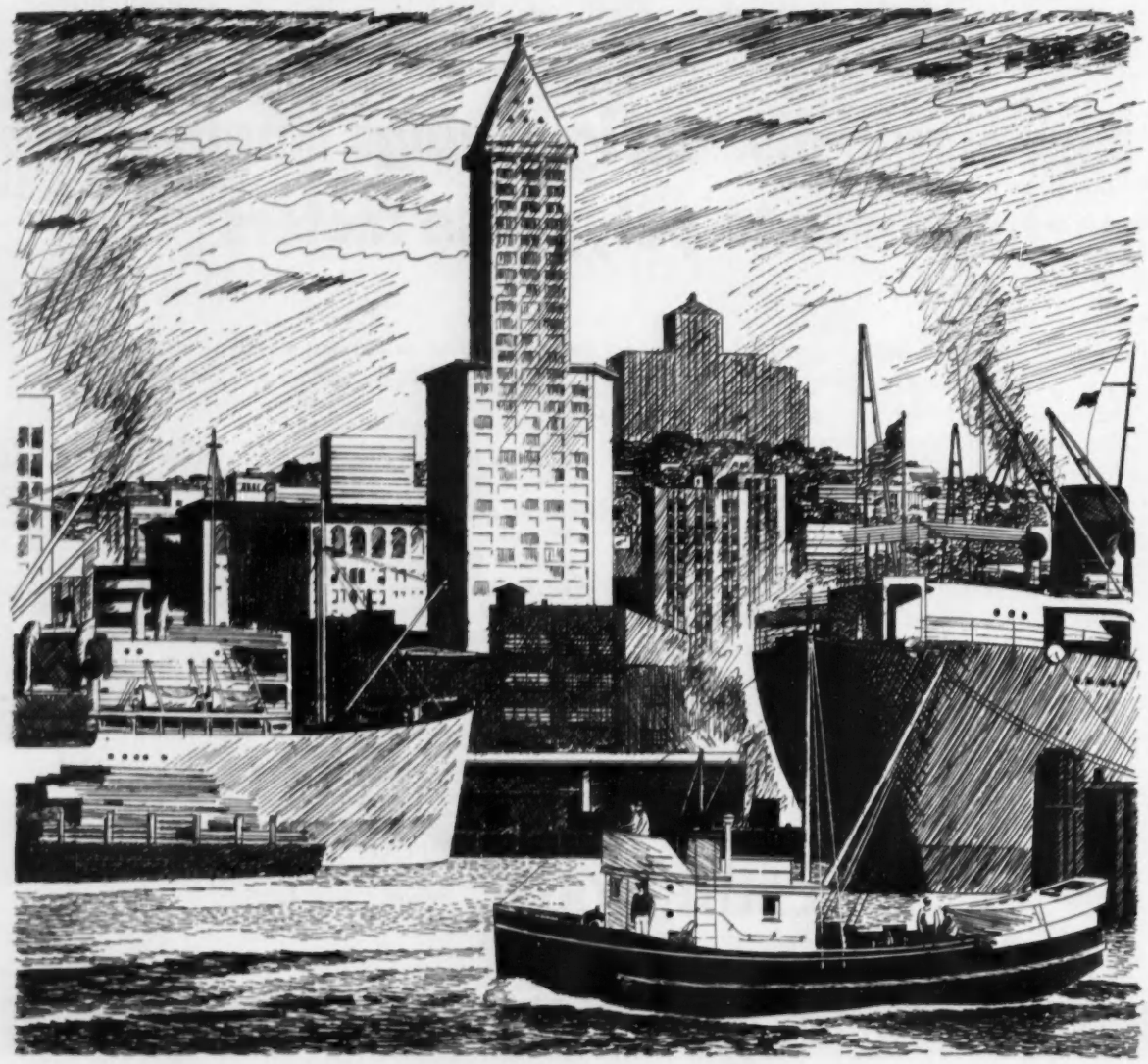
1918 Thermal Demand Meter

First practical answer to extension of demand rates to small, irregular loads. It featured bimetallic spring unit, led to introduction of combination thermal watthour meter in 1940.

1933 Socket Meter

The introduction of the socket meter in 1933 paved the way for outdoor metering—an outstanding contribution to the economy and simplicity of metering.

UNITED STATES STEEL AT WORK IN THE WEST—Seattle's 500-foot Smith Tower office building



WEST'S TALLEST BUILDING . . . a landmark of steel

Much of the West was still wild and woolly in 1914—the year the 42-story Smith Tower building was completed. In the passing time, Seattle and all the West have grown up around the famed landmark . . . but never above it. Now a venerable 41 years old, Smith Tower still stands as the West's tallest building and first true skyscraper framed with steel; all of it from the mills of *United States Steel.*

Yesterday, Today, and Tomorrow—Columbia-Geneva has for years helped to fill the steel needs of the West. We hope that when you need steel, you'll continue to look first to Columbia-Geneva, Western producing member of the industrial family that serves the nation—United States Steel.

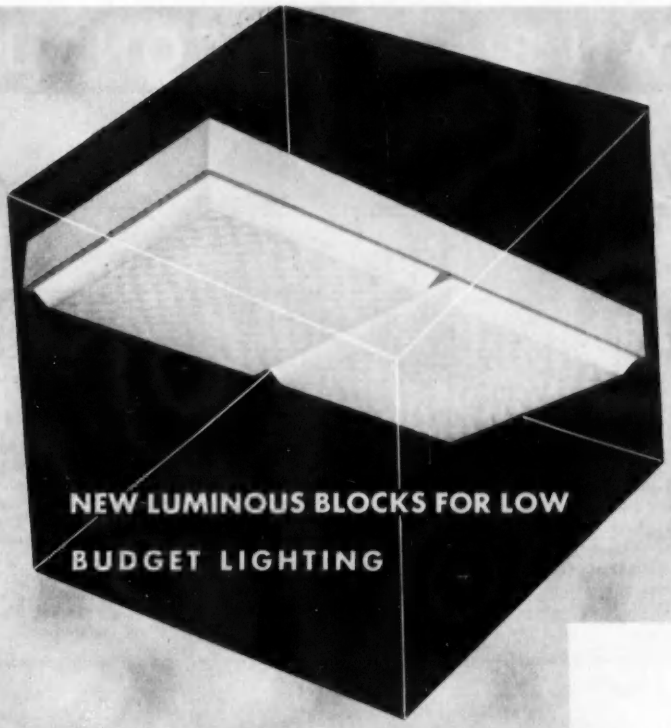
West's Largest Steel Producer

United States Steel Corporation • Columbia-Geneva Steel Division

SAN FRANCISCO · LOS ANGELES · PORTLAND · SEATTLE · SALT LAKE CITY · DENVER

USS

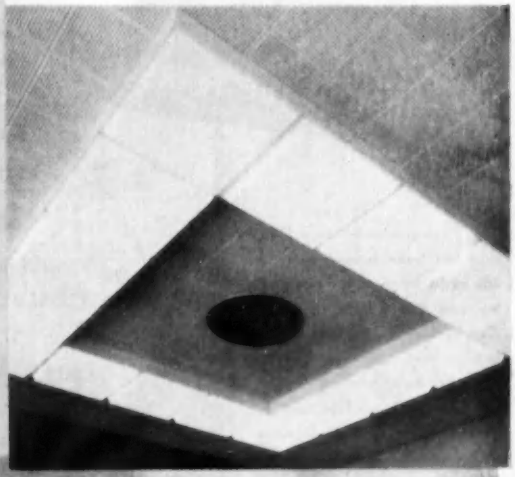
UNITED STATES STEEL

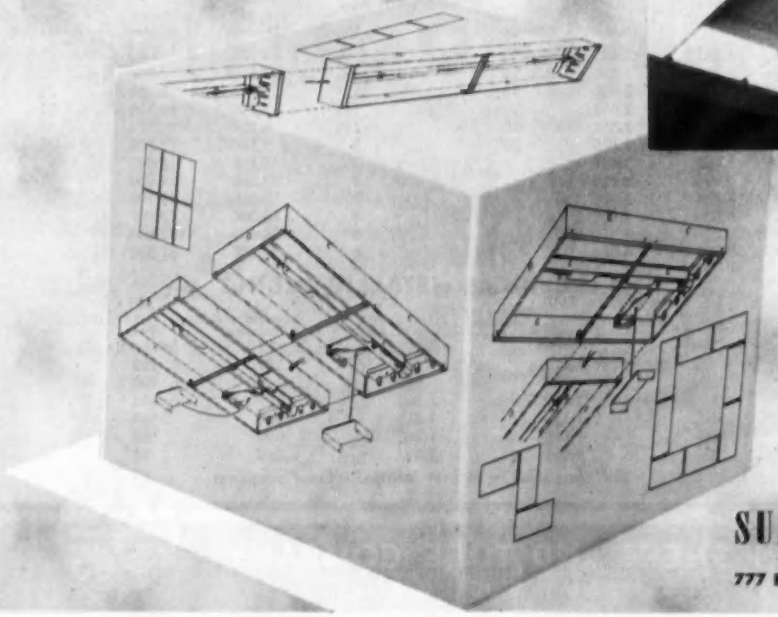


NEW LUMINOUS BLOCKS FOR LOW BUDGET LIGHTING

SUNBEAM visionaire LIGHTING COMPANY

A new degree of design freedom and lighting flexibility at lower initial cost is now at your command with Sunbeam's new Visionaires,® 7700 series. Almost as simple as putting blocks together, these all-white, surface mounted luminaires can be arranged in modern geometrical patterns and "large area" arrays with amazing ease. Solidly welded, the 7700 series is constructed in exact modules of 2′ wide by 4′, 6′ and 8′ long to readily match standard acoustical ceiling patterns. The rigidized diffuser panels are molded of translucent white vinyl producing pleasant, low brightness lighting. For complete information on Sunbeam's 7700 series, please write for bulletin A59.





SUNBEAM LIGHTING COMPANY

777 E. 14th PL., LOS ANGELES 21, CALIF.

YOUNGSTOWN BUCKEYE CONDUIT

HOT GALVANIZED: High quality steel pipe is first, thoroughly cleaned by pickling in acid, then immersed in a bath of molten pure zinc. After threading, a coating of tough, transparent enamel is baked on—providing double corrosion protection of zinc and enamel—inside and out.

ELECTRO GALVANIZED: After being threaded, reamed and carefully inspected, this conduit is cleaned by pickling, then uniformly coated outside with zinc. A coat of tough, elastic black enamel is then baked on the interior, providing protection as well as a smooth raceway for trouble-free wire pulling.

BLACK ENAMELED: A protection, black enamel coating is applied inside and out by dipping. When a uniform thickness of this coating has been achieved, it is then baked to form a tight, elastic, high lustre finish—guarding against cracking in bending or forming operations during installation.

ELECTRICAL METALLIC TUBING: Absolute uniformity of weight, wall thickness and concentricity, plus protective outside coating of pure zinc and baked-on elastic enamel interior, forms this modern mirror-smooth raceway. Lightweight, easy to handle, no threads to cut, bends readily and assures safe, economical, life-time electrical installations.

Proven — THROUGH THE YEARS

Yes, Youngstown Buckeye Conduit has been proven through the years by thousands of owners and by leading Electrical Contractors the world over . . . proven that it is easy to bend . . . easy to fish wires through . . . and economical due to greater corrosion resistance that means longer, trouble-free life in actual service. Youngstown Buckeye Conduit has also proven that it pays dividends through lower installation costs and greater efficiency. Add to these many features the fact that Youngstown Buckeye Conduit is manufactured "from iron ore to the finished product" by ONE integrated steel company and you know why it is prefered by so many.

CONDUIT

Size	Nominal Diameter (Inches) Internal	External	Nominal Wall Thickness (Inches)	Threads Per Inch	Feet Per Bundle
½	.622	.840	.109	14	100
¾	.824	1.050	.113	14	50
1	1.049	1.315	.133	11½	50
1¼	1.380	1.660	.140	11½	30
1½	1.610	1.900	.145	11½	30
2	2.067	2.375	.154	11½	
2½	2.469	2.875	.203	8	
3	3.068	3.500	.216	8	
3½	3.548	4.000	.226	8	
4	4.026	4.500	.237	8	
5	5.047	5.563	.258	8	
6	6.065	6.625	.280	8	

Conduit furnished in 10-foot lengths, threaded both ends with one coupling.

COUPLINGS

Size	Outside Diameter (Inches)	Length (Inches)	Pieces Per Carton
½	1.063	1.562	100
¾	1.313	1.625	50
1	1.576	2.000	50
1¼	1.900	2.062	50
1½	2.200	2.062	50
2	2.750	2.125	25
2½	3.250	3.125	
3	4.000	3.250	
3½	4.625	3.375	
4	5.000	3.500	
5	6.296	3.750	
6	7.390	4.000	

ELBOWS

Size	Radius (Inches)	Offset (Inches)	Pieces Per Carton
½	4.000	6.500	50
¾	4.500	7.250	50
1	5.750	8.750	25
1¼	7.250	10.500	20
1½	8.250	11.750	15
2	9.500	13.500	10
2½	10.500	15.000	
3	13.000	18.000	
3½	15.000	20.500	
4	16.000	22.000	
5	24.000	31.000	
6	30.000	37.500	

ELECTRICAL METALLIC TUBING

Size	Nominal Diameter (Inches) Internal	External	Nominal Wall Thickness (Inches)	Feet Per Bundle
½	.622	.706	.042	100
¾	.824	.922	.049	100
1	1.049	1.163	.057	100
1¼	1.380	1.510	.065	50
1½	1.610	1.740	.065	50
2	2.067	2.197	.065	30

EMT furnished in 10-foot lengths, without couplings.

BUCKEYE YOUNGSTOWN CONDUIT

THE YOUNGSTOWN SHEET AND TUBE COMPANY
GENERAL OFFICES • YOUNGSTOWN 1, OHIO • U. S. A.

YOUR INDUSTRY is served by a team of Shell Lubrication Specialists, every man an outstanding expert. Call in any member of this team and you benefit by Shell's *quarter-century of documented experience* with lubrication problems in your field!

Shell's men and techniques —with SHELL DIALA OIL AX—can help you

Slash sludge clean-up expense

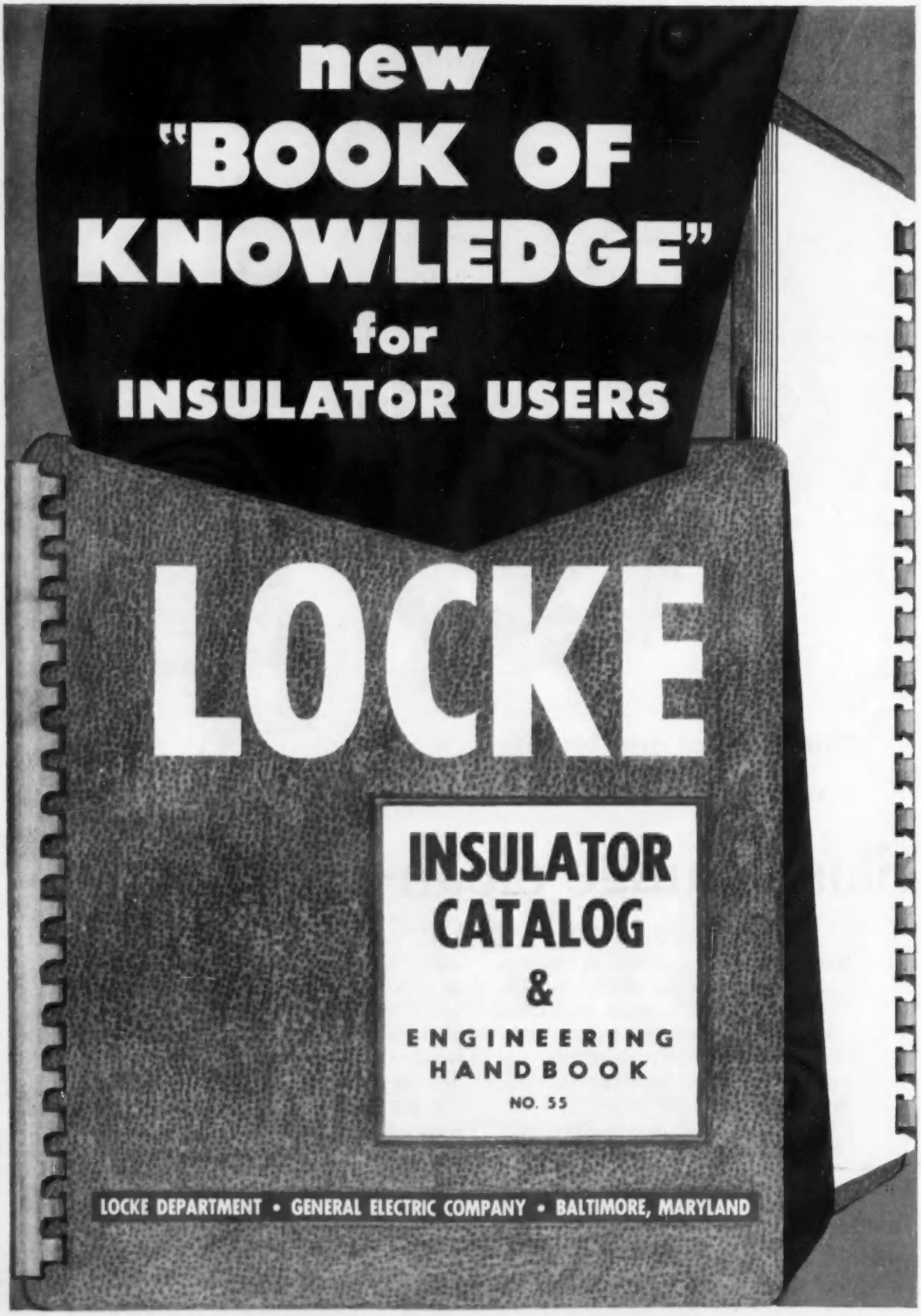
Sludge damage costs more than it need to ... unless you're using Shell Diala Oil AX. Developed by Shell Scientists, Shell Diala Oil AX is a near-perfect combination of Shell's own highly effective inhibitor and a special base oil. It can keep your equipment sludge-free *years* longer!

When Shell Lubrication Specialists prescribe Shell Diala Oil AX, you benefit by all of Shell's scientific study and experience with lubrication problems in your field. Shell Diala Oil AX—used as Shell recommends—can put sludge at the bottom of your list of transformer problems.

It will pay you to call your Shell Lubrication Specialist today!

SHELL DIALA OIL AX

SHELL


new
"BOOK OF KNOWLEDGE"
for
INSULATOR USERS
LOCKE
INSULATOR CATALOG
&
ENGINEERING HANDBOOK
NO. 55
LOCKE DEPARTMENT • GENERAL ELECTRIC COMPANY • BALTIMORE, MARYLAND

Locke's Insulator Catalog and Engineering Handbook

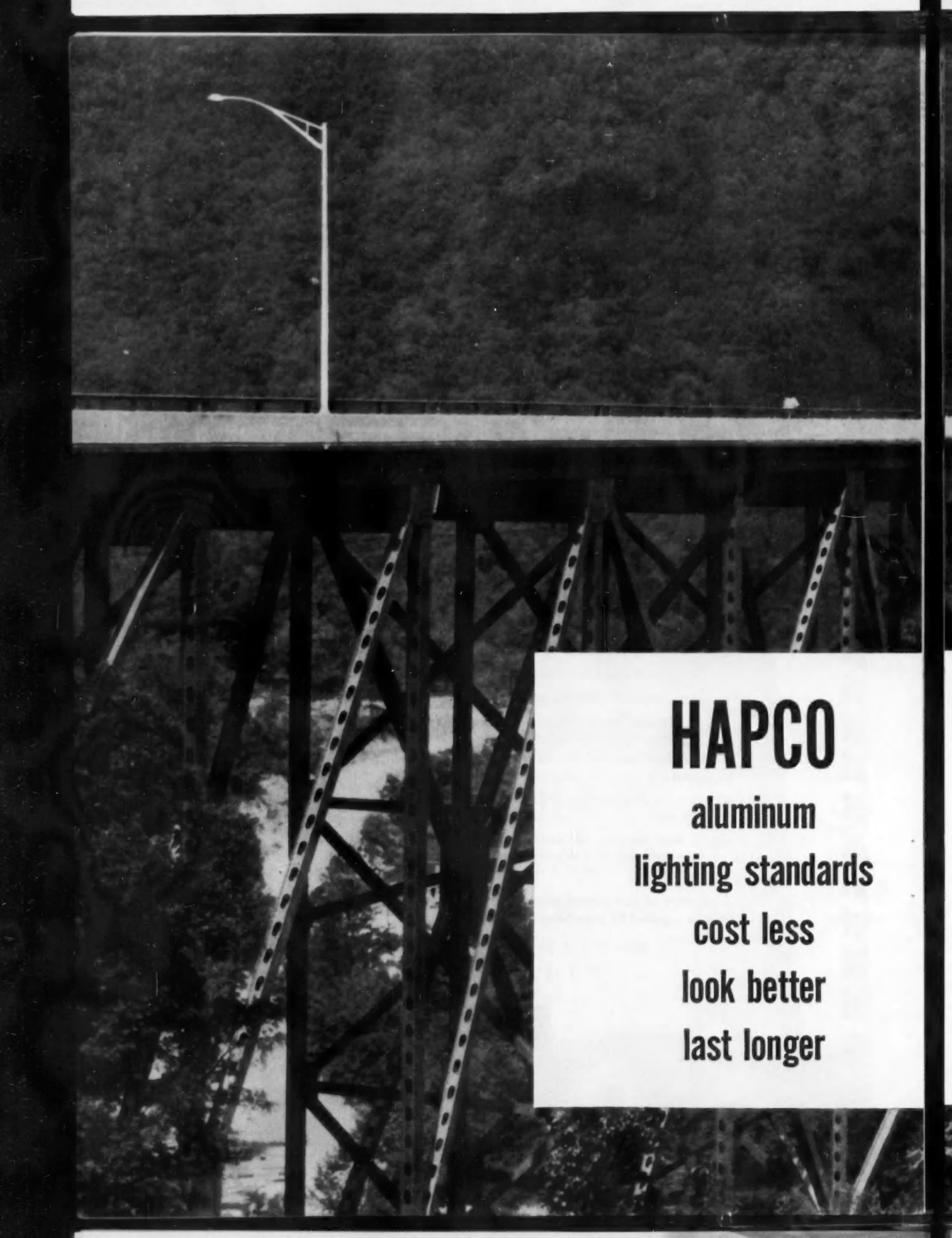
Designed to become your favorite source for complete, authoritative purchasing and engineering information on insulators and insulator hardware.

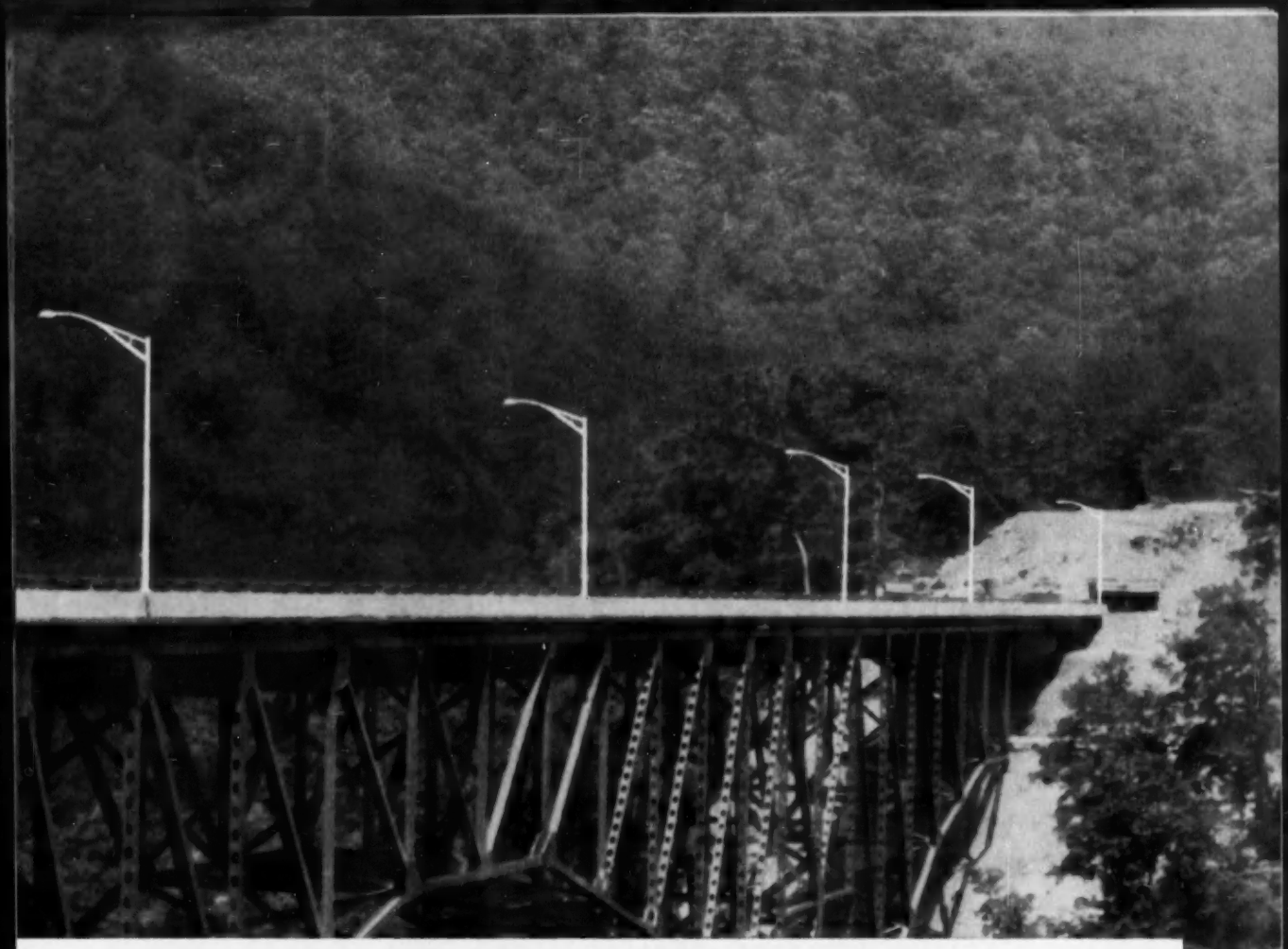
Included in its 233 pages of easy-to-use, alphabetically and numerically indexed material, you'll find these important features:

1. A completely new insulator product section, thumb indexed, makes it easy for you to quickly locate any one of over 800 insulators or insulator hardware items.
2. Complete description of physical characteristics of porcelain.
3. Six pages of clamp recommendations for various conductors.
4. Large section on lightning performance of transmission lines.
5. An expanded section on apparatus bushings with application and maintenance information.
6. Complete listing of all EEI-NEMA Standards, including proposed standards for apparatus insulators. (TDJ-58, 59)
7. The complete American Standards for apparatus bushings and test code.
8. A large general data section including standard insulator tests, cable specifications and many valuable tables for general calculations.

Your copy of this lightweight, spiral bound Insulator Catalog will be supplied by your local Locke Representative.

LOCKE


HAPCO
aluminum
lighting standards
cost less
look better
last longer



Hapco Lighting Standards cost less than other lighting standards when installed costs are carefully figured. In most cases, this saving is apparent as soon as the standards are erected. In a few areas a short period of service may be required before the costs drop below other types of standards. At this point the advantage continues to increase as long as the standards are in use.

The major reason for lower costs, as soon as the standard is put into service, is that Hapco Poles and Lighting Standards do not require that first painting job, nor any subsequent maintenance painting. Therefore, you can deduct the cost of the paint and the labor of applying it.

As for appearance, users all agree that the silver grey, Venetian column design of these standards has top eye appeal. Hapco Standards cost less, look better and last longer.

For more details, see your nearest distributor or write direct to Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pennsylvania. Better yet, if you have not received our 24-page Hapco Catalog on Street Lighting Standards (Catalog No. HAL-754), write to the above address for your copy. This catalog contains valuable information to help you plan the most efficient, most beautiful highway and street lighting, as well as any other outdoor lighting.

HUBBARD ALUMINUM PRODUCTS COMPANY
Division of Hubbard & Company
Pittsburgh 1, Pa.

To postpone electric utility investment in added generating station capacity

—an Electro-Mobile Power unit, costing about $100 per kw., places 1,000 kw. at any point of need...

—reducing fixed charges...

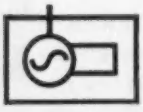
—obviating all new high-line expense...

—eliminating transmission-line loss.

It can be completely self-operated...

—and later used to fill other needs, anywhere, in a speedy, economical relocation.

Write for simple formula explaining investment advantages of Electro-Mobile Power to:



Rail car, truck trailer and portable units—350 to 1,000 kw.

VISIT GENERAL MOTORS POWERAMA

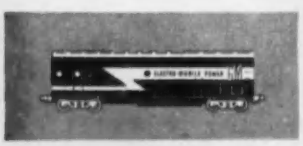
Lake Shore Drive next to Soldier Field, Chicago, Ill.— August 31st thru Sept. 25th

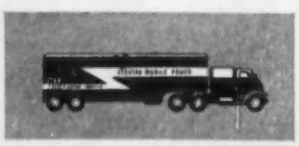
★ ★ ★ ★

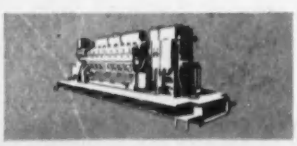
First showing of America's newest, most advanced lightweight train —and many other marvels of modern Diesel power.

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS • LA GRANGE, ILLINOIS

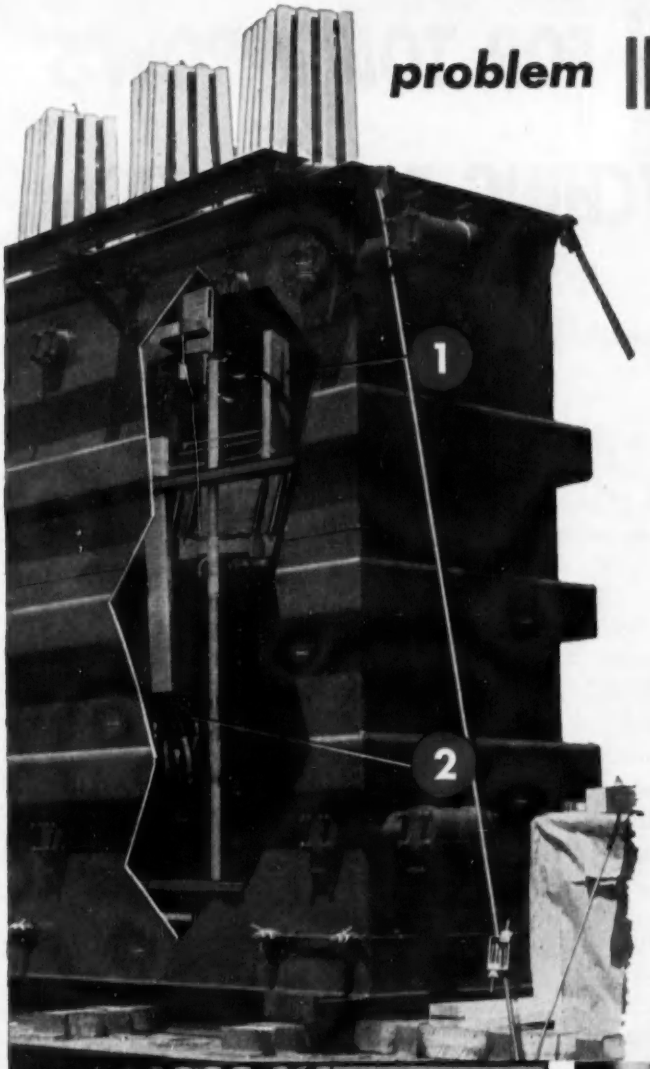






Sold and serviced directly through a manufacturer's organization. Electro-Motive Division offices located in: New York City, Chicago, Jacksonville, St. Louis and San Francisco.

How the solving of a shipping problem IMPROVED THE KUHLMAN TRANSFORMER

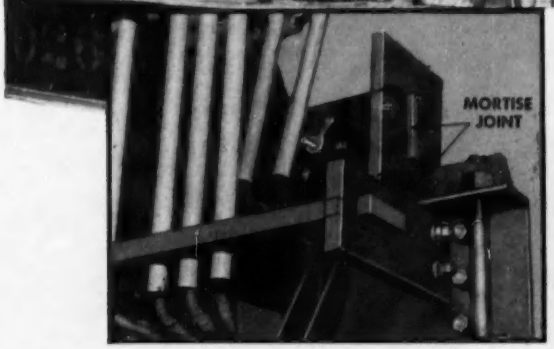


It started as a simple problem:

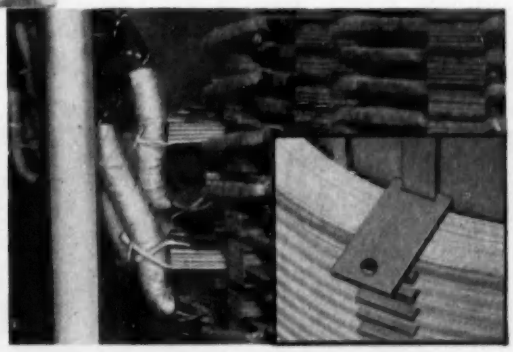
Kuhlman engineers wished to insure Kuhlman power transformers against damage in shipment to the lead guides, terminal boards, and tap changer mountings. They solved the problem, and the happy result is that the new improved Kuhlman power transformers are stronger, better units not only for shipping, but also for moving, installing, and for all-around reliability on the job. The facts are these: usually the construction joints near high voltage terminals are secured by fibre bolts; but the Kuhlman engineers supplanted these with mortise and tenon joints which are substantially firmer and which further produce a more compact arrangement of the terminal structure.

Kuhlman engineers also designed new tap lead supports. These supports, formed by extending the coil spacer nearest each tap lead connection, are anchored between coil sections by a "T"-shaped key on the coil insulation barrier. The tap leads are thus braced by the solid rigidity of the whole coil structure. This eliminates any possible shifting either from shipping vibrations or from operating stresses.

Thus the net result was not only to solve the problem in shipping but to bring about further improvements in the entire Kuhlman power transformer units.



1. Structural insulation with mortise and tenon joints.



2. Tap leads anchored to tap lead supports

Tap lead supports keyed to coil barrier

KUHLMAN ELECTRIC COMPANY 172

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

DISTRIBUTED BY MAYDWELL & HARTZELL, INC. SEATTLE • SPOKANE • PORTLAND • SAN FRANCISCO • LOS ANGELES • PHOENIX

PREPARE NOW FOR TOMORROW'S IN SWITCHING DISTRIBUTION

It's a matter of simple addition to get this modern device for the switching of distribution feeders . . . because an S&C Load Interrupter consists of an interrupting unit added to a disconnect switch.

And with an S&C Load Interrupter you can switch the modern way. You can drop the load—all of it—at once. No need to go through complicated unloading preliminaries—no need to open main breakers causing otherwise unnecessary interruptions. Outages are held to a minimum—line repairs can go forward immediately.

In addition, you can switch the circuit any time under any condition (except short circuit) . . . valuable protection against inadvertent operation or operation under emergency conditions. Switching with S&C Load Interrupters cannot lead to dangerous phase-to-phase or phase-to-ground faults. It cannot endanger men or equipment because there is no external arc.

If you've been delaying the use of S&C Load Interrupters because of budgets, remember that you can install S&C Convertible Disconnects *without* the interrupting units at the same price as conventional disconnects. Then, when you're ready to convert, you can quickly install the low-priced interrupting units with a hot line tool *without de-energizing the circuit.*

Ask your nearest S&C sales representative for information.

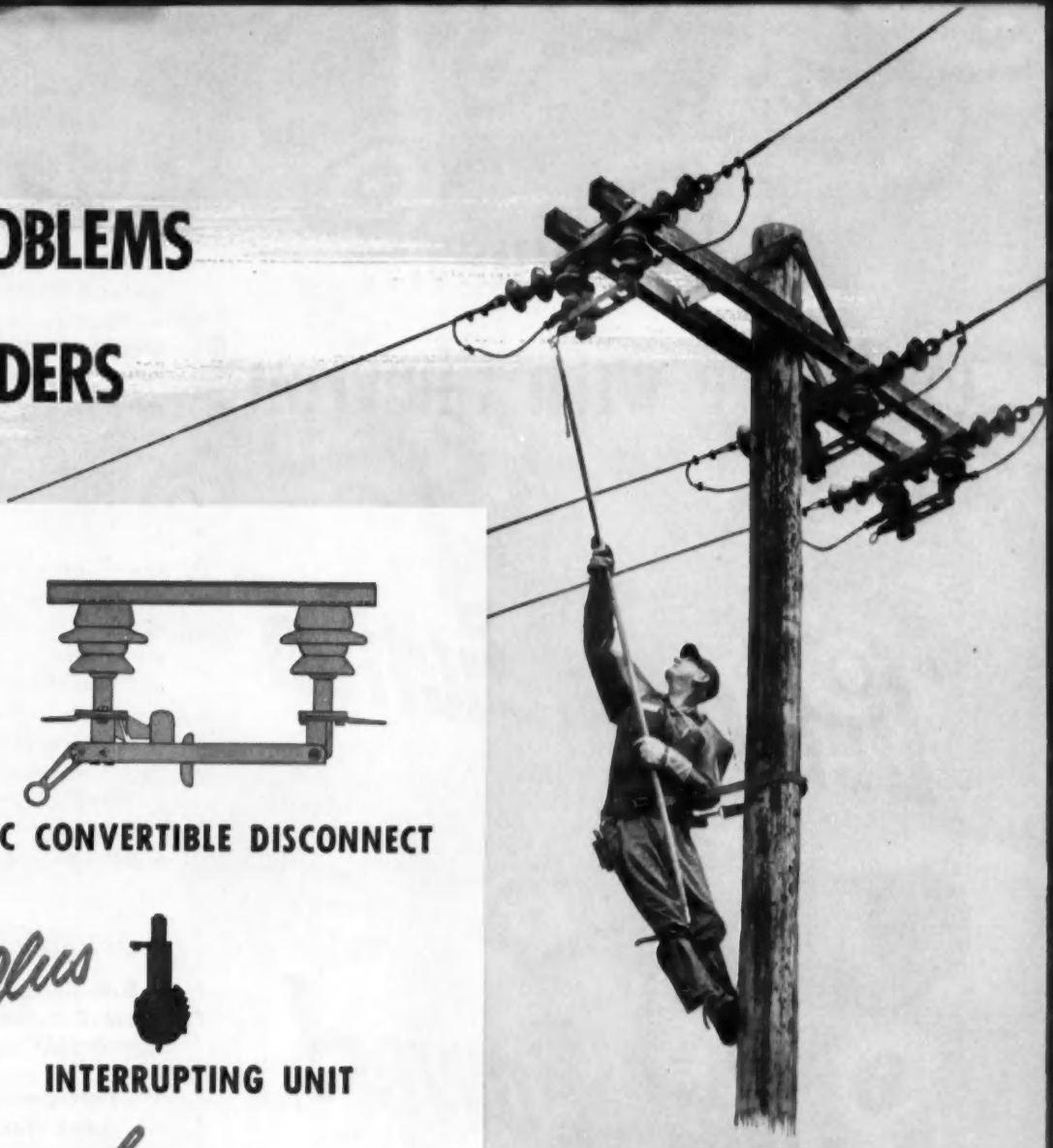
Specialists in High-Voltage Circuit Interruption since 1910

S&C ELECTRIC COMPANY

4425 RAVENSWOOD AVENUE • CHICAGO 40, ILLINOIS, U. S. A.
In Canada: S&C Electric Canada, Ltd., 8 Vanoco Road, Toronto 14, Ontario
POWER FUSES • DISTRIBUTION CUTOUTS AND FUSE LINKS • LOAD INTERRUPTERS • METALCLAD SWITCHGEAR

PROBLEMS

FEEDERS

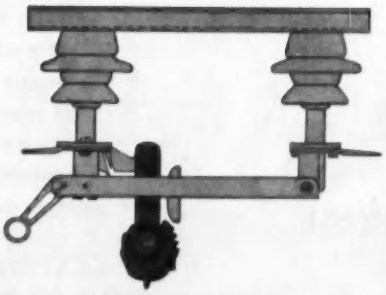


S&C CONVERTIBLE DISCONNECT

plus

INTERRUPTING UNIT

Equal



S&C LOAD INTERRUPTER

Catalog Section 760 tells in detail how the S&C Load Interrupter improves operating practices and saves money.

A big plus... exclusive with Chevron!

CHEVRON SUPREME GASOLINE

CHEVRON GASOLINE

STANDARD OIL COMPANY OF CALIFORNIA

+ New Power

The highest octane ratings in Chevron history are available now from Standard's newest method of refining gasoline! It means more power for your fleet cars in traffic, more pull for on- and off-highway trucks, more work from all gasoline-powered equipment.

+ "Detergent-Action"

the Chevron exclusive that *cleans out* carburetor deposits to end forever the biggest single cause of engine trouble! In addition, the refining improvements in Chevron Gasolines enable them to control a major source of harmful combustion acids—they can extend the life and power of your gasoline engines as much as 135%.

+ Balanced Performance

...from the combination of not 1, not 2... but *every* gasoline feature your engines need:

- **Detergent-Action**
- **Quick starting**
- **Area blending**
- **Vapor-lock protection**
- **Full power**
- **Smooth acceleration**
- **High anti-knock**
- **Economy mileage**
- **Fast warm-up**
- **Rust and corrosion prevention**
- **Longer engine life**

FOR EXPERT HELP on any fuel or lubrication problems, write or call your Standard Fuel and Lubricant Engineer or Representative, or write to Standard Oil Company of California, 225 Bush Street, San Francisco, California.

ADVANCED PLANNING for Hartford Electric Light Company's new Middletown, Connecticut, unit included this scale model surveyed here by (*l to r*) G-E's F. C. Roberts, Hartford's J. C. Sonntag, K. L. Partridge, G-E's A. P. Wylie, Hartford's S. Kusmik, D. C. Switzer, and H. T. Barrows.

Latest Hartford Electric Light expansion adds 66,000 kw to interconnected system at Middletown

Latest chapter in the far-sighted expansion program of The Hartford Electric Light Co. is the 66,000 kw Middletown station. Designed to serve residential and industrial load which has blossomed since World War II, this unit will help Hartford and its interconnected system companion, the Connecticut Power Company, meet the electrical needs of more than 100,000 people.

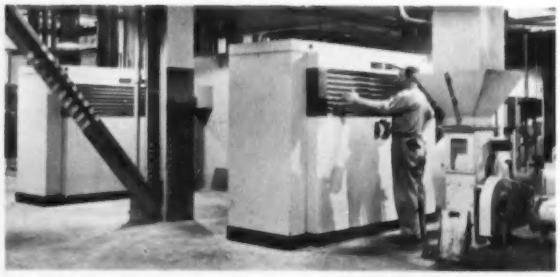
When the Hartford utility and its consultants, Stone & Webster, selected General Electric apparatus, their decision brought with it the advantages of G-E engineering teamwork. From preliminary design stages through final start-up, the G-E team assigned to the Middletown project gave vital assistance in keeping costs down and in meeting construction schedules.

GENERAL ELECTRIC

For More Data See Next Page ▶

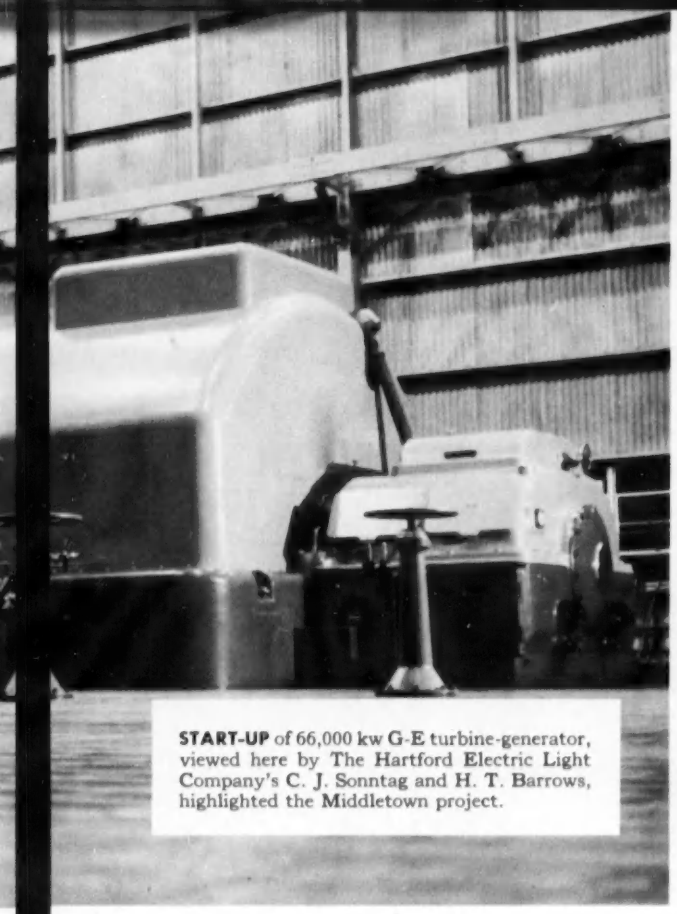
G-E engineers integrate electrical equipment

PROPER SELECTION of G-E motors, such as one viewed here by J. C. Sonntag, G-E's F. C. Roberts, Hartford's S. Kusmik, assured Hartford of better continuity of operation.



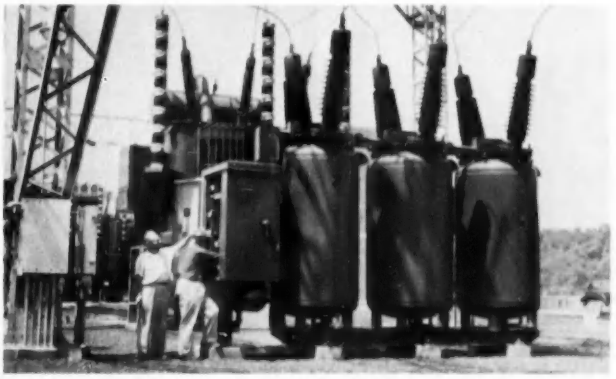
G. E. TRAINS OPERATORS to assure best use of equipment. Here a HELCO operator becomes familiar with 750 kva, 2400/480 volt load center unit substations.

STATION PLANS GET APPROVAL of D. Douglas (*l*), Power Production Consultant, Hartford Vice President C. L. Derrick (*r*), as Roberts and Wylie look on.



START-UP of 66,000 kw G-E turbine-generator, viewed here by The Hartford Electric Light Company's C. J. Sonntag and H. T. Barrows, highlighted the Middletown project.

THOROUGH PLANNING simplified later work. Above: S&W's L. O. Waite, G-E's L. E. Crane, S&W's H. N. McCampbell, G-E's J. Horvath, Jr., S&W's T. A. Fearnside.



SUPERVISED INSTALLATION of 115 kv G-E circuit breaker was one of many G-E Project Services.

designs to help HELCO boost system capacity

Unit responsibility for correlation of apparatus helps utility and Stone & Webster conserve engineering time

To aid in implementing the early planning on Hartford Electric Light's Middletown, Connecticut, station, a team of General Electric engineers was assigned to the job. Their task: integrate equipment design, manufacture and delivery, help keep installation on schedule. As a result, both the Hartford utility and its consultant, Stone & Webster, were able to conserve valuable engineering time and expense.

During the station's progress, for example, the G-E Project Engineer assumed the responsibility for coordinating changes in associated electric apparatus necessitated by revisions in major equipment. His work thus freed Stone & Webster and Hartford engineers of many details, enabled them to concentrate on the project's more important phases. And for Hartford, this unit responsibility resulted in maximum flexibility and station efficiency.

Similar teamwork, combining the utility, its consulting engineer and the G-E team of sales engineers, product specialists, application engineers, order service coordinators and field service engineers can also save you time, money and man-hours. Here's what G-E Project Services can do:

Simplify ordering of equipment, purchased either directly, or through your consulting engineers, or through a machinery manufacturer.

Conserve engineering time by handling electrical details which frees you and your consulting engineers for other urgent problems.

Integrate equipment design to assure the maximum flexibility and effectiveness of plant operation.

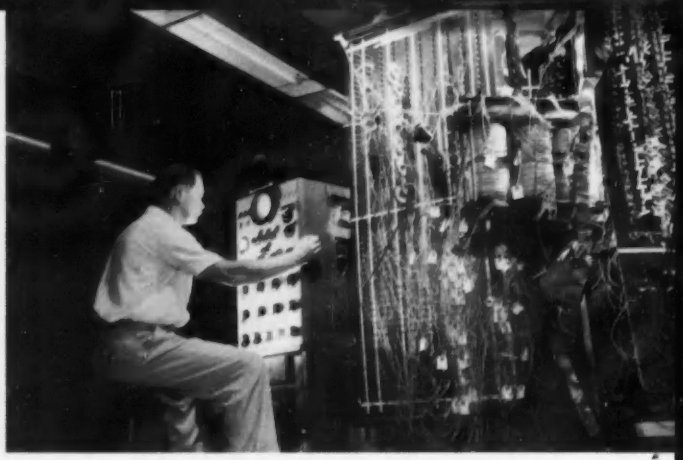
Speed construction by scheduling the arrival of equipment for minimum installation time.

Assist in installation and in training operators to assure minimum start-up time and better understanding of the full operating capabilities of the equipment. For details contact your G-E Apparatus Sales Representative, or write to Section 302-9, General Electric Company, Schenectady 5, N. Y.

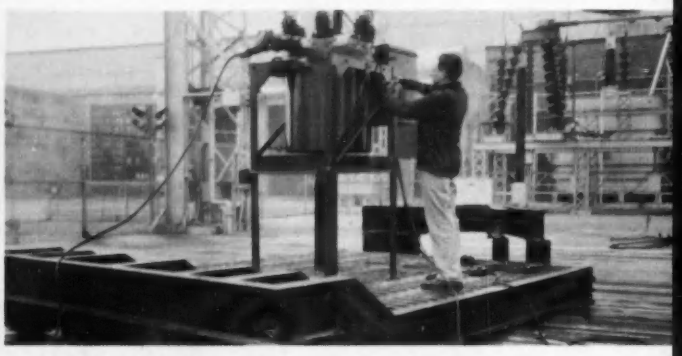
More Power to America

GENERAL ELECTRIC

NEW LONGER TURBINE BUCKETS promise higher turbine ratings, discussed here by C. W. Elston and L. H. Auchmoody, of G-E Large Steam Turbine-Generator Dept.



NEW TRANSFORMER DESIGNS, lighter and smaller, having improved thermal and electrical characteristics, are resulting from electromagnetic model testing.



NEW DISTRIBUTION BREAKERS, with faster interruption to minimize chance of line burn-down, are exemplified by this new production 5-cycle distribution breaker—from G-E's Switchgear Development Laboratory.

G-E product development assures electric utilities of improved system apparatus to meet future loads

As demands for electricity continue to soar, the advantages of General Electric product development become increasingly clear. From a vast network of G-E laboratories outstanding engineering advances have come to improve product operating reliability, extend product life. With these as the foundation, utilities have been able to step up station efficiency and—more important—prepare their systems for tomorrow's loads.

Product Development is just one of the many important benefits gained on your job when you or your consultant specifies G-E equipment. You can take advantage of all these services with G.E.:

Application engineering helps assure that all the items of electrical equipment are coordinated in design and operation.

Product development means you get equipment that incorporates latest design features.

Field service engineering means supervised installation, planned start-up, proper operation of equipment.

Service engineering helps keep plant operating at full capability, means training of operators, setting up of maintenance programs.

Project coordination helps assure proper selection, design, manufacture, delivery of your equipment without costly delays at installation time.

More Power to America

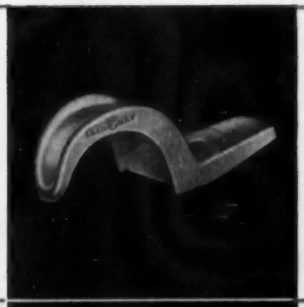
GENERAL ELECTRIC

STRAPS...STRAPS...STRAPS...

and every one saves time every time

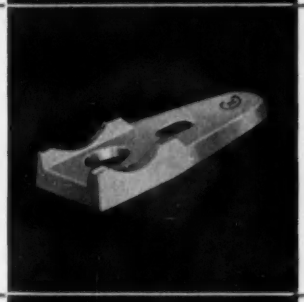
JUST LOOK at this Gedney line of straps! Every type you want...and every feature that speeds installation and pulls down installed costs. Malleable iron that stops breakage. Hot dip galvanizing that spells longest service life. Individual inspection that assures top quality. And all these straps are available in a full range of standard sizes...Order Gedney fittings from your wholesaler for today's best buy—and write us for your copy of the complete Gedney catalog.

GEDNEY NAIL STRAPS for rigid conduit, E.M.T., armored cable, S.E. cable, etc.



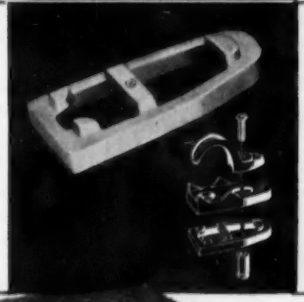
GEDNEY ONE-HOLE STRAPS for rigid conduit, S.E. cables, and E.M.T. Sizes ⅛" to 6". Hot dip galvanized.

GEDNEY ONE-HOLE STRAPS for oval cables. Hot dip galvanized.



GEDNEY CONDUIT SPACERS OR CLAMP BACKS for rigid or E.M.T. Hot dip galvanized.

GEDNEY "UNIVERSAL" ONE-HOLE STRAPS for S.E. cables. Hot dip galvanized.



GEDNEY NEST BACKS — a supplementary spacer for use with pipe straps and clamp backs. Hot dip galvanized.

GEDNEY
ELECTRIC COMPANY

GEDNEY

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Foundry, Factory and Shipping Point: Terryville, Conn.

WESTINGHOUSE ELECTRIC CORP.
MADE IN U.S.A.
TYPE 44 INSTRUMENT CHART
Style No. 172657
Lot D2LE K2
6 PM
4 PM
3 PM

Helping the industry meet its growing loads

Designing instruments to help management make sound decisions

Electric utility managements continually face the urgent question, "How do we improve present system efficiencies and intelligently plan for future capacities?"

To be of true value, their answer to that question must be founded upon accurate, up-to-date information about their own particular operations.

Westinghouse has long anticipated that today's swiftly paced expansion in power systems would accentuate the need for accurate recorded information, a basic foundation in making sound management decisions. Needs of the industry were surveyed, and one timely answer to the kind of instruments desired now appears in the new Westinghouse line of strip chart recorders—the Type 44.

Operational efficiencies and economies are studied by means of the recording voltmeters. Recording varmeters show where the power is being wasted and corrective measures are needed. Recording wattmeters and ammeters give you the information necessary to plan for load growth, proper distribution, and the addition of generating equipment and distribution facilities.

All of these new recording instruments can help you cut costs, develop more reliable operation, make better planning decisions for the future. Indirectly, they will also help you maintain stability and continuity of service, thereby protecting customer good will.

The Type 44 recorder is another example of Westinghouse contributions to electric equipment pioneering. Westinghouse makes a full line of electric measuring instruments for every electric utility requirement—will gladly help you apply them to your instrumentation systems. J-97191

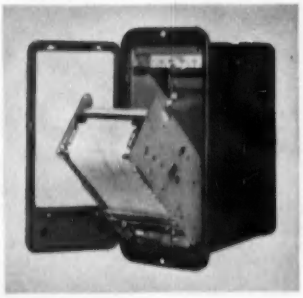
YOU CAN BE **SURE**...IF IT'S

Westinghouse

Plants at Berkeley, Calif.; Sunnyvale, Calif.; Emeryville, Calif.; Los Angeles; Portland; Salt Lake City; Seattle; Denver

Greater Accuracy

New, iron-core measuring mechanisms develop twice the torque of previous designs . . . provide faster response, accuracy within 1% under all operating and load conditions.



Ease of Use and Service

All parts are fully accessible from front of recorder, a particular advantage in flush switchboard mounting.

Versatility

Used to make operation and load studies in electric power generating stations, substations, field surveys, and in field service. Also used in industrial applications to check machine performance and factory distribution systems.

Less Mounting Space

Recorder has highest ratio of scale width to panel area, is attractive in appearance and easy to read.

Economy

Less maintenance, long charts last 70 days . . . large ink capacity permits operation for greater unattended periods.

Dependability

Extremely high overload capacity reduces possibility of burnouts. All mechanisms self-shielded against stray magnetic fields.

For more information on Type 44 recorders, call your Westinghouse representative or write direct to Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

PRODUCT NEWS

Lineman's Belt

(1) Miller Equipment Co. Inc., 13th & New St., Franklin, Pa.

Comfort and additional safety have been designed into this new lineman's belt, according to the manufacturer. The wide russet strap leather support part of the belt is said to permit a higher working position further from the pole at the same time it protects against back strain. The manufacturer says that it also helps support tool weight and holds tool belt in position.

Aqueous Homogeneous Reactor

(2) Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.

This company has announced it is ready to design and build, for completion by 1960-61, an advanced type of nuclear power plant at a cost competitive with some present power stations. An aqueous homogeneous power breeder system would be used, though its development was once considered "long term" by the Atomic Energy Commission. The system utilizes a spherical core containing a solution of uranyl sulphate in heavy water in which the fission of uranium 235 generates the heat required.

Wedge-Type Dead-End

(3) Fargo Mfg. Co., 939 Main St., Poughkeepsie, N. Y.

Easy release for sagging and faster installation are two features stated by the manufacturer of this new wedge-type service cable dead-end. Wedge and shell are aluminum and bail is phosphor bronze plated. One dead-end is said to fit conductor sizes from No. 6 solid through No. 2 ACSR.

Steam Turbine-Generators

(4) Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.

WA-series impulse steam turbine of this manufacturer has been extended to AIEE-ASME preferred ratings to and including 16,500 kw. The original series, started five years ago, carried NEMA ratings of 2,000 kw and up.

Media Sorter

(5) Underwood Corp., 1 Park Avenue, New York 16, N. Y.

A high-speed electronic media sorter that operates from a standard typewriter keyboard and handles original forms of various weights and sizes is a new product of this company. Said to be a completely new concept in business machines, the Rapid-Sort works directly with such media as sales checks, bank checks, tax bills and job tickets. To operate, the operator simply glances at the top copy to determine the classification, strikes the typewriter keys accordingly and the media are rapidly whisked to the proper bins, the manufacturer states. It is said to replace many manual sorting operations.

A-C Dynamometer

(6) Sensitive Research Instrument Corp., 9-11 Elm Ave., Mount Vernon, N. Y.

This dynamometer, DYL, is reported to be a 1/10 of 1% accuracy instrument specifically designed for 50 to 70 cycle, or 50 to 500 cycle use. It has 18 internally controlled ranges in volts, milliamperes and amperes, and reads in current from 5 ma to 500 ma full scale. The manufacturer states that the instrument's wide range eliminates purchase of other instruments to cover the range spread.

For More Data Fill in Coupon on Page 60

Field forces are always within earshot with Bell System mobile facilities

You get the most efficient use of company vehicles when you can reach your maintenance crews by telephone at any time. The Bell System offers several types of Mobile Radio arrangements.

General Service: Your fleet can be reached from any telephone. Also, your field forces can call any telephone reached by the Bell System.

Dispatching Service: Your dispatcher can talk to any units in your fleet.

Signaling Service: Your maintenance crews can be signaled over this one-way service and carry out any prearranged instructions, such as calling your office from a public telephone.

Private Mobile Systems: Radio equipment will be provided and maintained for eligible radio licensees. You get the advantages of Bell System engineering, installation and maintenance experience.

Mobile communications can be engineered to meet your specific requirements. For a free survey of your needs, simply call your Bell Telephone representative.

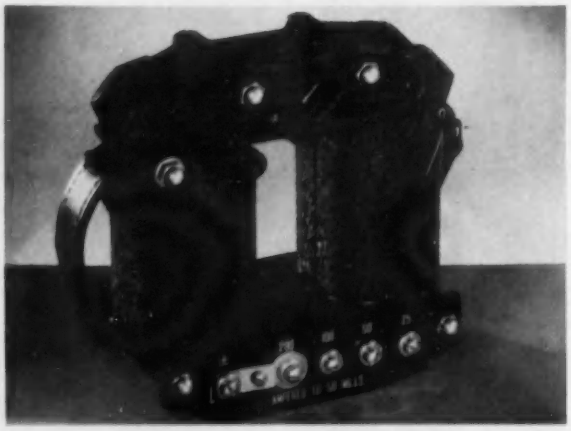
BELL
TELEPHONE
SYSTEM

TELEPHONE TELETYPEWRITER MOBILE RADIO
TELEMETERING AND REMOTE CONTROL CHANNELS

Circuit Breaker Maintenance

(7) I-T-E Circuit Breaker Co., 19th & Hamilton St., Philadelphia, Pa.

Normal maintenance of 7.2- and 13.8-kv metal-clad switchgear is now made easier by a circuit breaker arrangement that permits each interrupter assembly to be tilted back by hand and firmly anchored in inspection position, according to this manufacturer. Inspection position gives full view of interrupter plates within the chute and makes the contact assembly accessible for examination.



Split-Core Transformer

(8) Esterline-Angus Co. Inc., Box 596, Indianapolis 6, Ind.

The Annis split-core current transformer is primarily intended to measure current in an a-c circuit where it is not feasible or possible to disconnect bus bars or cables and connect a solid-core transformer. Can be used with various recording, indicating or integrating instruments. Available in several sizes and current ratings, the most popular size has primary ratings of 150/300/600 amp, the manufacturer reports. The special size pictured was designed specifically for use with the company's rectifier-type a-c recording ammeter.

Radiant Heating Panel

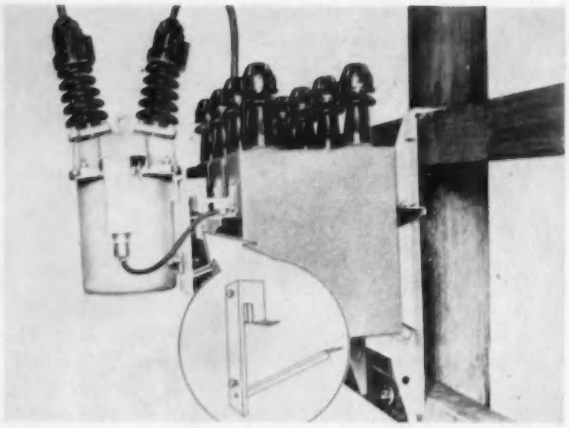
(9) Berko Electric Mfg. Corp., 212-40 Jamaica Ave., Queens Village, N. Y.

A choice of two models, one with built-in thermostat, one without, is offered with this new 1,500-w radiant glass panel electric space heater. Constructed in three power input ranges, 120, 208 and 240 v. Radiant heating is from heat resistant glass panel coated with an electrically conductive material, according to the manufacturer.

Guy Clamps

(10) Line Material Co., Milwaukee 1, Wis.

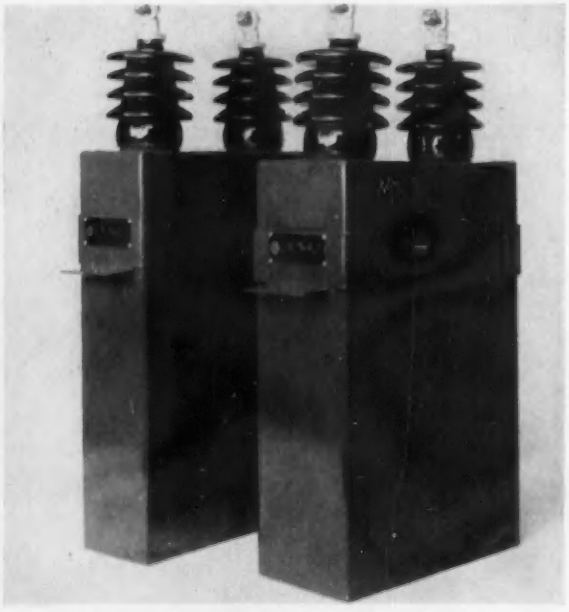
New offset guy clamps developed by this company are available in two sizes, one for ¼- to ⅜-in.-diameter strand, and the other for 5/16- to ½-in.-diameter strand. Said to develop holding power in excess of the breaking strength of the strand.



Capacitor Switch Bracket

(11) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Economical and simple conversion of fixed pole-top banks to automatically switched units is possible with this new switch bracket, according to the manufacturer. The galvanized steel bracket enables users to mount type CSO capacitor switches on standard three- or four-unit capacitor mounting brackets without removing the capacitor units or lifting the assembly from the pole.



High-Voltage Capacitor

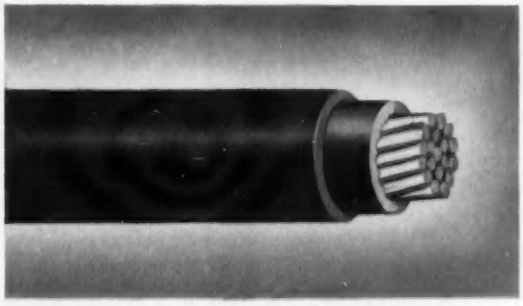
(12) Cornell-Dubilier Electric Corp., South Plainfield, N. J.

This new 33⅓-kvar capacitor is designed to meet demands for larger concentrated blocks of reactive kva at lower weight and cost levels, the manufacturer states. The unit is said to be 10% heavier than conventional types but provides more than 30% additional corrective kvar. The company has estimated that use of the capacitor will result in more than 10% savings in cost per kvar. It is at right.

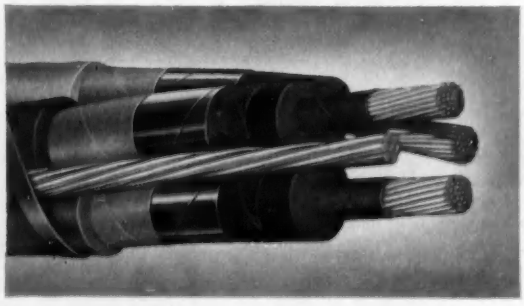
10 reasons why

you should specify, buy,

install U. S. GRIZZLY® POWER CABLES



U. S. Grizzly Power Cable, 600 volts – Type RR single conductor, Hydrosec® – S heat- and moisture-resistant insulation, Neoprene jacket.



U. S. Grizzly Power Cable, 15,000 volts – Type RR – 3-conductor, Uskorona® – ozone-resistant insulation – shielded – Neoprene jacket.

1. Lighter in weight than lead-sheathed cables and lead-sheathed armored cables.
2. Greater flexibility
3. Easier to handle during installation
4. Easier to splice, tap and terminate
5. More resistant to chemical corrosion
6. Unaffected by stray currents
7. Better protection against weathering
8. Longer life
9. Cost less
10. Made by United States Rubber Company, the *only* electrical wire and cable producer to grow its own natural rubber, make its own synthetic rubber and manufacture its own plastics

U. S. Grizzly Power Cables are used for general power distribution, and can be installed in conduits, underground ducts, buried directly in the ground, or installed aerially. Neoprene jacket protects against acids, alkalies, oils, and mechanical damage and weathering. (All IPCEA and NEMA specifications complied with.)

Write to address below for free copy of illustrated reference manual on U. S. Electrical Wires and Cables for the electric utility industry. It lists the type of cable best suited for specific requirements.

US RUBBER

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Leads of 48-inch 600-volt #12 wire furnished as standard equipment.

Bushing-Mounted Indicating Fuse with 48-inch lead can be supplied.

Solder-Sealed Bushings of strong one-piece wet-process porcelain provide a positive, lasting seal.

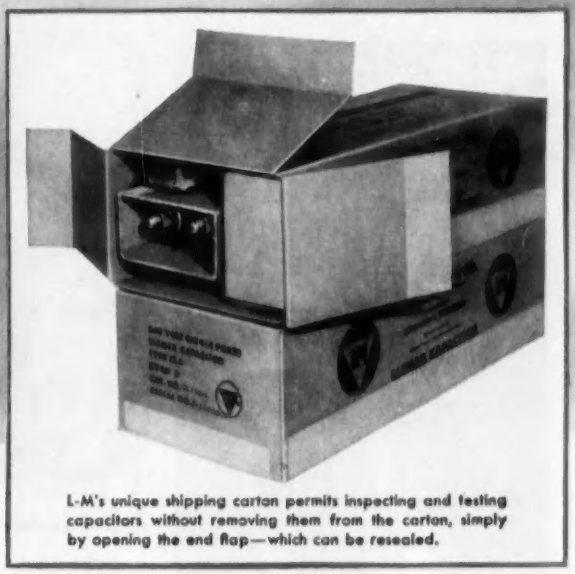
Pole-Mounting Bracket has two 9/16" holes for ½" lag screws. Standard EEI-NEMA crossarm-mounting bracket furnished if required. Capacitor can be mounted with bushings up or down.

Aluminum Metallizing process protects steel tank from oxidation; is followed by a chromate primer and a finish coat of alkyd resin paint.

Single-Pack, Round-Tank Design makes these capacitors small, light, easy to install. Unit has a one-minute discharge resistor; is completely impregnated under vacuum with low temperature Elemex liquid dielectric.

LM® LINE MATERIAL

Left: L-M's 5 kvar is 18⅛" high, weighs only 25 lbs. The 3 kvar is 13¾" high, weighs 18 lbs. These weights include the pole-mounting brackets. Standard EEI-NEMA crossarm-mounting bracket furnished if desired.



L-M's unique shipping carton permits inspecting and testing capacitors without removing them from the carton, simply by opening the end flap—which can be resealed.

Small, Light, Easy to Install . . .

L-M's New Secondary Capacitors Provide Needed Vars For Air-Conditioning Loads

Solder-sealed bushings, aluminum metallized finish on tank, and single-pack construction assure long life, low maintenance.

By **BLAINE SCHULTZ**
Section Engineer
Capacitors
Line Material Company

L-M's new secondary capacitor is your solution to the problem of poor voltage regulation and overloaded transformers caused by low-power-factor air-conditioning loads.

The unit is small, light, and rugged; easy to install on crossarm or direct pole mounting. It offers you outstanding design features, such as aluminum metallized tanks, solder-sealed bushings, one-minute discharge resistor, single-pack round-tank construction, and low-temperature Elemex liquid dielectric.

Protective Coating

L-M's unique aluminum metallizing process prevents oxidation of the steel tank and greatly extends the life of the capacitor. This process is followed by a chromate primer and a finish coat of alkyd resin paint. The finish coat is dark in color to facilitate heat radiation and keep the capacitor at low operating temperatures.

Solder-Sealed Bushings

Strong solder-sealed bushings of one-piece wet-process porcelain provide a positive, lasting seal. By eliminating gaskets and clamps we eliminate leakage. Therefore the capacitor can be mounted with bushings up or down.

Pack Construction

The packs are assembled in air-conditioned rooms to assure uniformity and are tested with over-voltage to eliminate any actual or potential defects. The units have a one-minute discharge resistor to assure safe handling and storage.

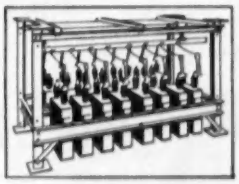
L-M's new 240-volt, pole-mounted, secondary capacitors are available in 3 and 5 kvar. 48-inch leads are furnished and external bushing-mounted indicating fuses can be supplied when required.

Ask us for complete information

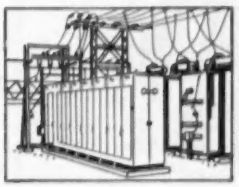
Ask the L-M Field Engineer for complete information on construction and application of L-M's secondary pole-mounted and submersible capacitor equipments, 2400- to 13,800-volt equipments, and our capacitor bank engineering service. Or write Mr. Delaney at Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

Other L-M Capacitor Equipments

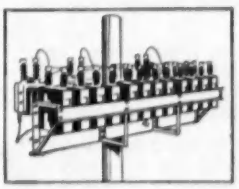
L-M offers a complete line of power capacitor equipments, such as these:



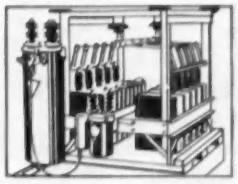
Factory-assembled blocks, which save time and money in building large banks.



Metal-enclosed capacitor equipments in all NEMA-standard sizes and ratings.



Factory-assembled racks for pole-mounted banks, both three-row and single-row styles.



VDS-Method factory-assembled block for multi-step bank switching—an exclusive L-M method that offers a substantial saving on switching equipment.

Also custom-designed protective and switching schemes.

Elemex® Capacitors

Rely on Quality—

PYLE-NATIONAL INDUSTRIAL LIGHTING FIXTURES

for safety

IN HAZARDOUS LOCATIONS

EXPLOSION PROOF

Pyle-National LE Series: Class I, C and D

For use in locations where highly flammable materials are manufactured or handled.

Rugged, flame-tight cast aluminum alloy housings render internal explosions harmless, and insure safe operating temperatures. Threaded construction permits easy access to interior for wiring and lamp replacement. Available in many types and sizes.

DUST-TIGHT

Pyle-National DE Series: Class II, Groups, E, F and G

For use in locations where flammable dusts are present in quantity.

Strong, one-piece cast aluminum alloy housings are designed to exclude dust from the interior and to avoid accumulation of dust on the exterior surface. Available in many types and sizes.

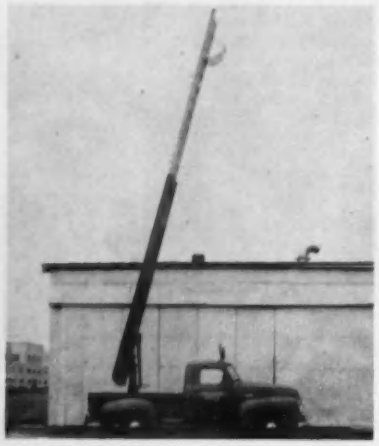
Consult the new PYLET Catalog for complete line of explosion-proof supporting PYLETS for lighting fixture mounting.

THE PYLE-NATIONAL COMPANY

1364 N. KOSTNER AVENUE CHICAGO 51, ILLINOIS

District Offices and Representatives in Principal Cities of the United States.

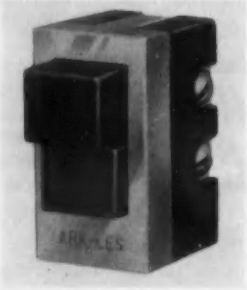
PLUGS AND RECEPTACLES • FLOODLIGHTS • CONDUIT FITTINGS



Aerial Ladder

(13) American Truck Equipment Co., Swan Island, Portland, Ore.

This manufacturer offers a new low-cost aerial ladder capable of extending to heights of 30 ft and designed for mounting on small trucks. It is raised with a hand-operated hydraulic pump and ram or, for additional cost, a 6-v electric motor. Operational range is from horizontal to 10° from vertical; rotating 360°.



Push-Button Switches

(14) Ark-les Switch Corp., 51 Water St., Watertown 72, Mass.

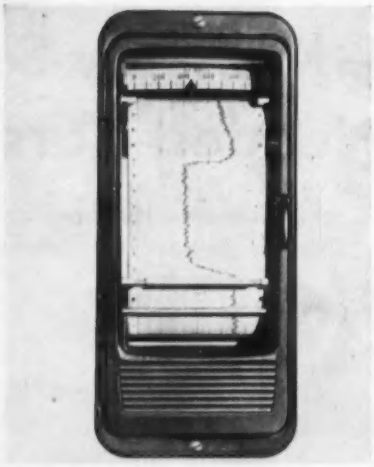
These push-button switches are suitable for a wide variety of electric appliance applications, according to the manufacturer. They are designed for on-off, single- or double-pole, single-throw controls. Rated at 20 amp 125 v, and 10 amp 250 v, a-c/d-c, the switch can also be supplied as a single-button, momentary-contact circuit control.

(15) **THERMOSTAT**—To meet demands for a single heavy-duty wall thermostat that will control both heating and air conditioning equipment, Fulton Sylphon Division of Robertshaw-Fulton Controls Co., Box 400, Knoxville, Tenn., has developed the combination thermostat No. 801-A3. A manually operated summer-winter switch provides the change from heating to cooling.

Metal-Enclosed Switchgear

(16) Allis-Chalmers Mfg. Co., 939 S. 70th St., Milwaukee, Wis.

A new line of low-voltage, metal-enclosed switchgear announced by this company features new circuit breakers rated 600 amp, 25,000 aic at 600 v, and 1,600 amp, 50,000 aic at 600 v. Reversible panels are mounted on each breaker compartment permitting the doors to be closed with breakers in the connected, test or disconnected positions. Available in both indoor and outdoor arrangements. Each breaker compartment is barriered from the bus compartments independently of the breaker frame and from adjoining breaker compartments by a double steel wall. The new switchgear is described more completely in bulletin 18B8283, "Allis-Chalmers Low-Voltage Switchgear."

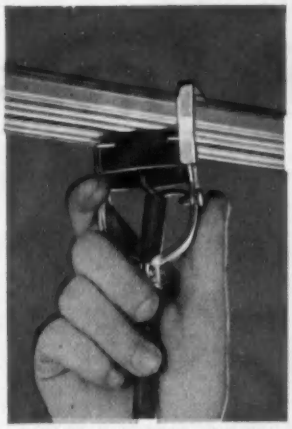


Recording Instruments

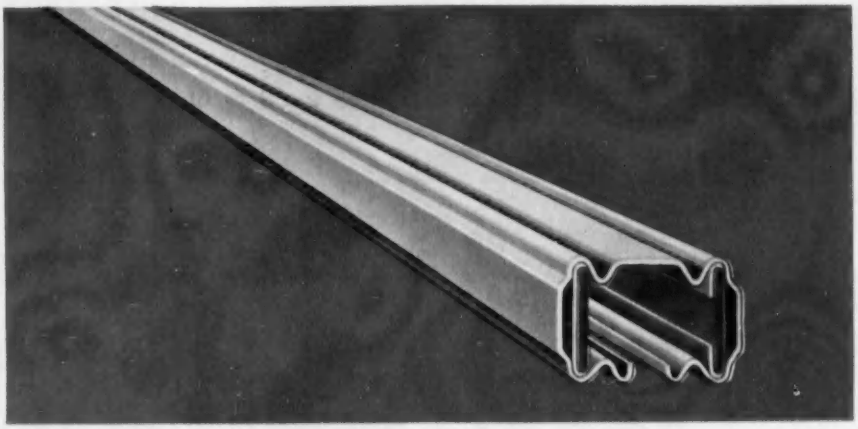
(17) Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

This new line of direct-acting recording instruments is expected to simplify maintenance and operation, provide improved reliability and permit substantial reductions in space requirements, according to the manufacturer. The recorders, known as the type 44 line, are available as ammeters, voltmeters, wattmeters, varmeters and frequency meters in models for portable use or for flush or projection mounting. A forward-tilting chart drive mechanism permits adjustments and maintenance to be made from the front without removing the instrument.

For More Data Fill in Coupon, Page 60

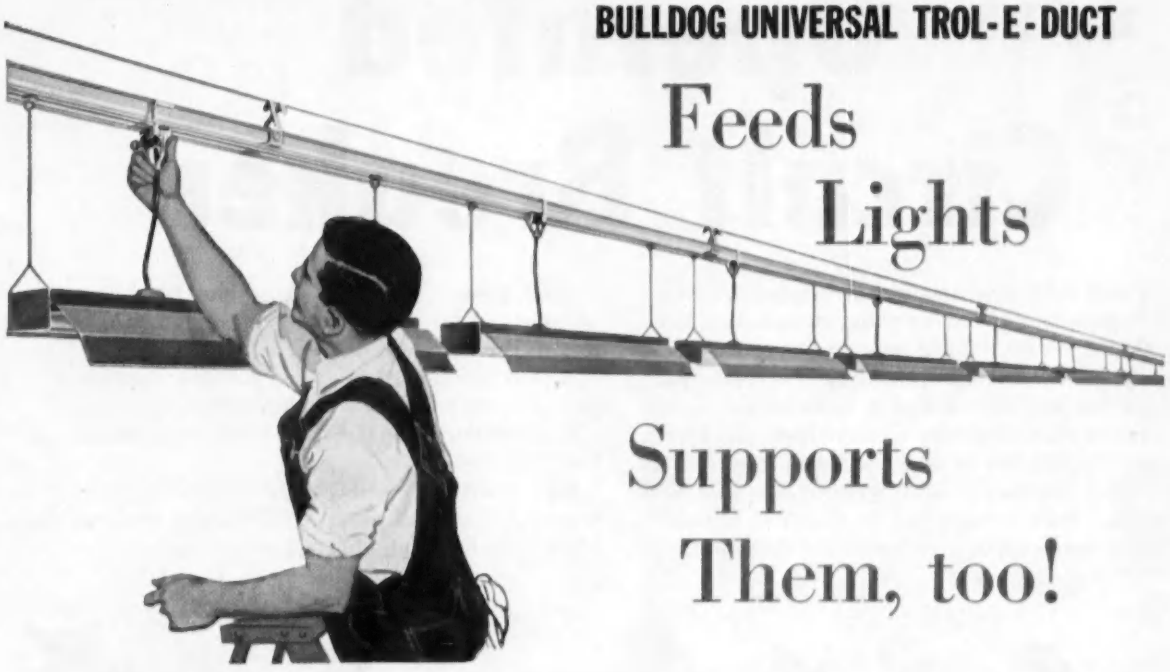


A TWIST AND LIGHTS ARE CONNECTED. Twistout Plugs give positive, safe connections in seconds.



IT'S A CONTINUOUS OUTLET. Cutaway view shows how copper bus bars run the entire length of Universal Trol-E-Duct, making it every inch an outlet. Moving trolleys that roll effortlessly on steel wheels are also available to bring mobility to small power tools.

BULLDOG UNIVERSAL TROL-E-DUCT



Feeds Lights Supports Them, too!

YOU GET COMPLETE MOBILITY WITHOUT DOWNTIME OR REWIRING

Avoid the expense of suspending lights separately. Sturdy Universal Trol-E-Duct®—the original bus bar system for lights and small power tools—supports lights in addition to supplying *flexible* power to operate them.

Movable weight supports let you position lights where you want them. Twistout Plugs tap power anywhere along the duct. You can arrange, change, add or remove lights as desired—without rewiring, power shutoff or downtime. You save on over-all costs . . . get a safer, more efficient system.

Investigate the double utility, double value of BullDog Universal Trol-E-Duct.

Call your BullDog Field Engineer or Qualified Distributor for all the facts. Or, write: BullDog Electric Products Company, Detroit 32, Michigan. ©BEPCO

IF IT'S NEW
. . . IF IT'S DIFFERENT
. . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY
A Division of I-T-E Circuit Breaker Company

Export Division: 13 East 40th Street, New York 16, New York. *In Canada:* BullDog Electric Products Company (Canada), Ltd., 80 Clayson Road, Toronto 15, Ontario.

CONSULT THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

COAST ELECTRIC & MANUFACTURING CO.
1733 N.E. Seventh Avenue, P.O. Box 7712
Portland 12, Oregon

YOUNG ELECTRIC & MFG. CO.
2134 Curtis St.
Denver 2, Colorado

SAFETY SWITCHBOARD COMPANY
910—89th Avenue
Oakland 21, California

BULLDOG ELEC. PROD. CO. OF LOS ANGELES
2885 E. Washington Blvd.
Los Angeles 23, California

Allis-Chalmers...for Progress

The World's Largest

Hydraulically Operated Circuit Breaker

THIS Allis-Chalmers circuit breaker is now installed on a Western power system. It is rated 230 kv, 10,000,000-kva interrupting capacity.

The *Pneu-Draulic* operator used on this breaker is of the same basic design as those used on operators for Allis-Chalmers breakers from 13.8 kv up, and 500,000-kva to 10,000,000-kva interrupting.

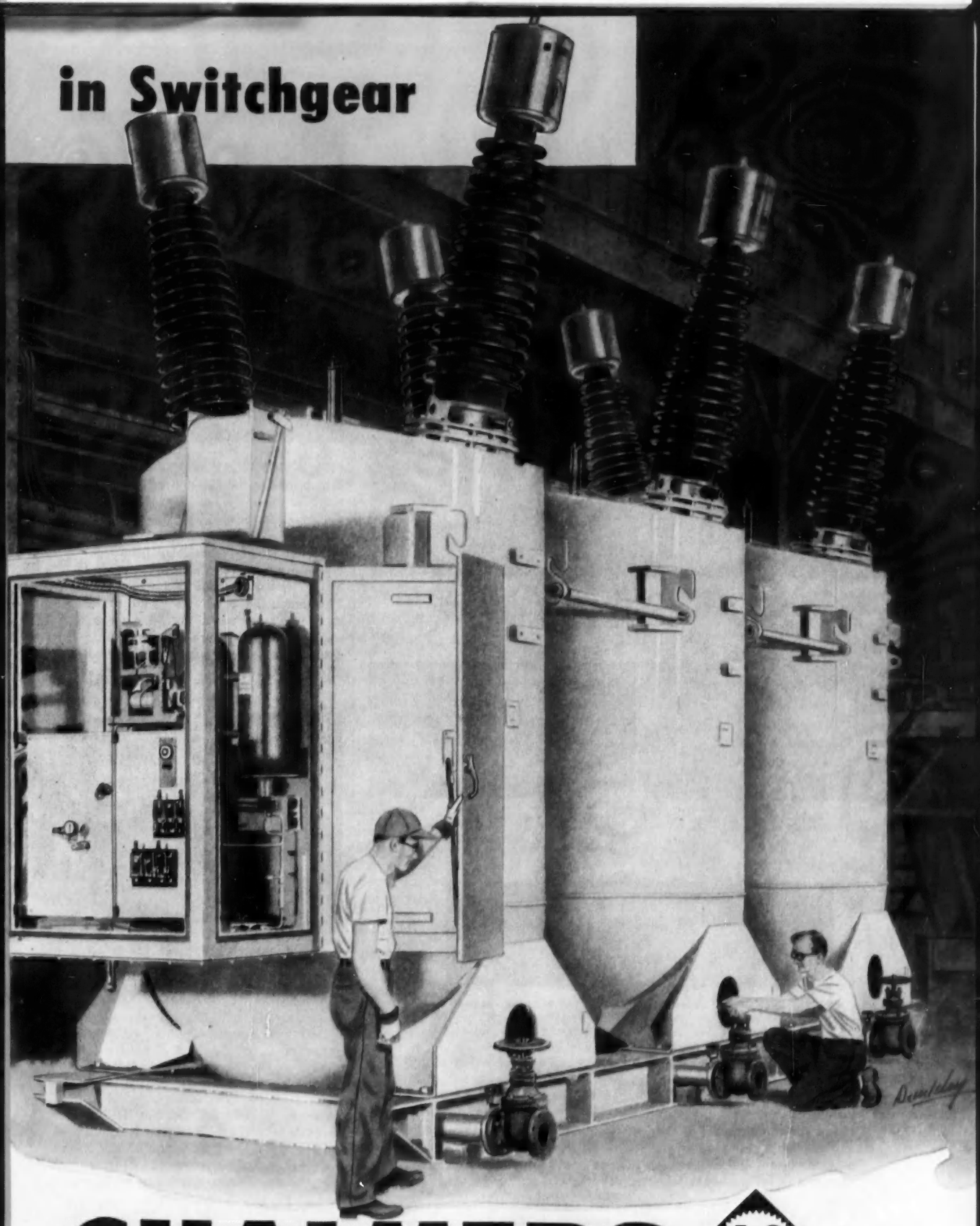
With the *Pneu-Draulic* operator even this enormous circuit breaker can be closed at full-rated speed under emergency conditions without use of control power. One man using one hand can easily pump up sufficient pressure in less than a minute for full-speed closing.

And it is perfectly safe to do this only because the operating mechanism is *mechanically trip-free.* Allis-Chalmers alone builds *all* breakers mechanically trip-free.

GET COMPLETE INFORMATION: Call your nearby A-C office or write Allis-Chalmers, General Machinery Division, Milwaukee 1, Wisconsin.

Pneu-Draulic is an Allis-Chalmers trademark.

ALLIS-


in Switchgear
CHALMERS
A-C
ALLIS-CHALMERS
A-4663

FOLLOW these 6 easy steps to get EXTRA CONSTRUCTION SAVINGS AND LONGER CONDUCTOR LIFE with fine FANNER ARMOR RODS superformed

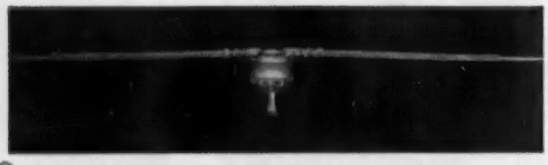
1 Select the proper rod size and number of rods in a set for size of conductor to be armored.

2 Hold one or two rods with centers close to conductor at the support point and rotate rods, keeping fingers held close to installed portion. (About one pitch away—not further).

3 With a rotary wiping motion of the hands install these rods for a distance of about 2 pitches each side of center.

4 In like manner install successively the remaining number of rods for the "set".

5 When all rods are installed for the initial distance, rotate entire group with rotary wrist action and continue until the ends snap into place.



6 The final installation of Superformed Armor Rods will appear smooth and uniform (no clips or clamps are ever needed).

Fine FANNER Superformed ARMOR RODS are applied easily and quickly . . . provide positive, lasting protection for overhead conductors. These precision-formed, rugged wires of special spring type metals, when applied as shown in the illustrations, minimize chances of rod distortion, assure proper rod distribution around conductor, and eliminate crowding of last rod in set. An enlarged reprint of these 6 steps to real construction savings is available to you for the asking. Ask our agents or write for copy now!

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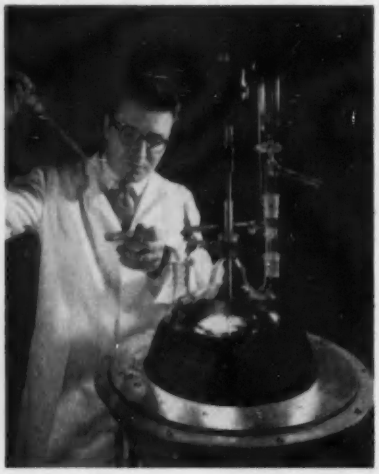
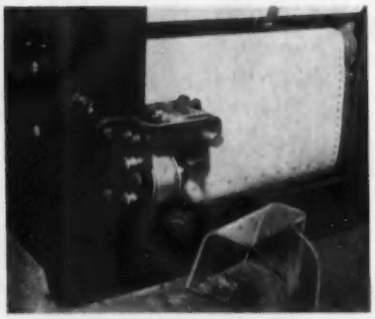
THE FANNER MANUFACTURING CO.
Brookside Park • Established 1894 • Cleveland 9, Ohio
AGENTS IN PRINCIPAL CITIES



(18) ELECTRICAL EQUIPMENT, that is both smaller and longer lived, will be the result of Westinghouse development of a new insulating enamel for copper wire. The company reports that electric motors insulated with the new enamel can operate continuously for 10 years at a temperature of 325 F without damage to the insulation. This time is equivalent to normal operation of a refrigerator motor for 30 years or a washing machine motor for about a century. It is a modified polyester-type resin containing about 20% silicone



Identification Device

(19) Royson Engineering, Hatboro, Pa.

Printing of a number, date or time on recorder strip charts is done by this device at any instant voltage is applied during process, test or control work. Unit is called Identichart and is said to make it easy for users to identify sections of recording charts. It mounts on the outside of the door of the recorder, regardless of type of instrument, according to the manufacturer.

(20) INSTRUMENTS — A new series of dielectric test instruments with output voltages up to 6,000-v a-c combines visual indication of leakage, breakdown and short circuits with a loud buzzer signal. Made by Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill.

Make more money
WITH THE MOST MODERN DEVELOPMENT IN HEATING

AUTOMATIC
Cavalier
ELECTRIC
BASEBOARD HEAT

Surrounds the home with a curtain of warmth

THE GENTLEST HEAT IN THE WORLD! No hot spots, so gentle a child can touch it. Place furniture against it without harm. Only Cavalier stays below 125° Fahrenheit, surface temperature.

FOR NEW HOMES AND OLD. Easily installed. No need to tear into walls. Two lengths fill every need—with 32" and 48" sections you can make any multiple of 16 inches.

ADDS PRESENT AND FUTURE VALUE. Homes heated with Cavalier Baseboard are worth more today and tomorrow. Discriminating buyers recognize its value—a big assist in meeting selective buying. *The finest heat you can have* will last a lifetime. No moving parts—requires no care, no maintenance.

INDIVIDUAL ROOM CONTROL. Thermostat in each room maintains the desired temperature . . . *automatically*. Here is "zone" control at its best. You choose the heat you want *by rooms*, not by sections of the home. For example, have it mild in bedrooms, warmer for grandmother's or baby's room. Warmth is supplied quickly and evenly.

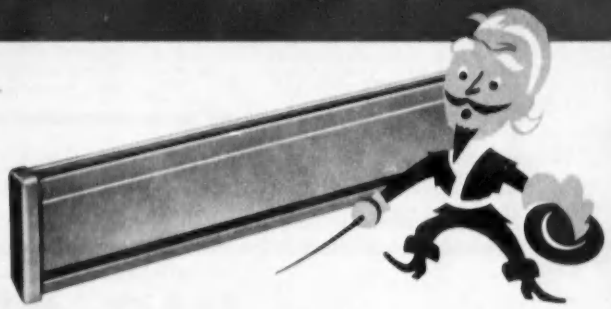
NEWEST DESIGN FEATURES OFFERED ONLY BY CAVALIER. Exclusive zig-zag baffles give air maximum travel over and around heating element. 100% efficient. Unique aluminized front baffle reflects heat away from front maintaining a cool exterior surface.

BLENDS BEAUTIFULLY WITH MODERN INTERIORS. Paint Cavalier Baseboard to match the trim in each room. Blends so perfectly it appears to be the usual baseboard trim found in homes.

MADE AND GUARANTEED BY CAVALIER—a respected name for 90 years. Cavalier automatic electric heaters are part of a family of nationally known products that have brought year-after-year customer satisfaction.

PROFITABLE FOR YOU. Cavalier helps you sell through national and cooperative local advertising. Increase your profits by promoting electric heat business. You sell more materials while selling your services. With Cavalier, your business-like markup is protected—Cavalier heaters are sold only through electrical contractors.

Phone your distributor or write Electric Heating Division, CAVALIER CORPORATION, Chattanooga 2, Tennessee



TRUE *BALANCED* HEAT

Cavalier Automatic Electric Baseboard Heat puts the heat where it is needed most—between the household and the cold outside. Gentle radiant heat with draftless circulation gives *balanced warmth, wall-to-wall comfort at all levels*. Individual automatic room control maintains desired temperature accurately.

HOW CAVALIER BASEBOARD WORKS

Cool air enters baseboard at floor level. Inside heater, the air is channeled over and around the heating element by Cavalier's exclusive zig-zag baffle. The warmed air rises and comes out from top. A "secondary" air current flows from the top of rear air passage. This extra flow picks up heat that otherwise would be lost into the wall and brings it out into the room where it is needed most. Gentle radiant rays do the rest in the simplest, most effective heating system ever devised.

WITH CAVALIER'S COMPLETE LINE OF NATIONALLY ADVERTISED AUTOMATIC ELECTRIC HEATERS AND ITS AGGRESSIVE COOPERATIVE AD-PLAN, YOU CAN

Be there first with the best

Send for catalog and price list.

- Reaches hard to get at spots
- Bores holes up to 10 feet deep from any truck position
- Low cost—easy to use—easy to transport
- Industry tested and accepted

DIG HOLES—SET POLES WITH YOUR LINE TRUCK AND
TEL-E-LECT'S POLE HOLE DIGGER

When your derrick truck is equipped with a Tel-E-Lect Digger, your crew can dig a hole and set a pole in less than five minutes! This rugged auger, suspended from a front or rear mounted derrick, is raised or lowered by the winch line. Auger rotation power is supplied through a telescoping drive shaft connected to the PTO.

This efficient digger reaches up on a hill, down into ditches, or across obstacles . . . anywhere up to 20 feet behind the truck. The interchangeable hardened steel augers, 8" to 20" in diameter, are built to operate under the most rugged soil conditions.

Distributed by: Am. Equip. & Body Co., Los Angeles • Robbiee's Utility Equip. Co., Seattle • Sagvare Body & Equip. Co., Phoenix • Utility Body Co., Oakland, Calif. • Williamson Body & Equip. Co., Ogden, Utah.

Tel·E·Lect PRODUCTS, INC.
10,025 Minnetonka Boulevard Minneapolis 16, Minnesota

FROM NATION-WIDE WAREHOUSE STOCKS*

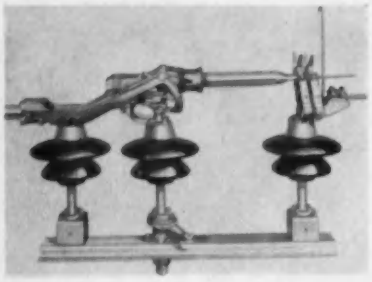
Now available!

BIG CABLES
WITH THE SUPERB
TOUGHNESS
AND
FLEXIBILITY
FOUND ONLY IN

Bronco 60 Certified Type W cables are made in all sizes from 8/2 to 1/4. They have a tough Neoprene jacket certified by a registered professional engineer to contain not less than 65.46% Neoprene. Made with coarse or fine stranding for incomparable flexibility.

Sold nationally only through Electrical Wholesale Distributors and manufactured by
WESTERN INSULATED WIRE CO., Los Angeles 58, California

* *Warehouse Stocks Maintained in the Following Cities:* ATLANTA, GEORGIA • BALTIMORE, MARYLAND • BOSTON, MASSACHUSETTS • BUFFALO, NEW YORK • CHICAGO, ILLINOIS • DETROIT, MICHIGAN • KANSAS CITY, MISSOURI • LOS ANGELES, CALIFORNIA • LOUISVILLE, KENTUCKY • MINNEAPOLIS, MINNESOTA • NEW YORK, N. Y. • PHILADELPHIA, PENN. • SAN FRANCISCO, CALIFORNIA • SEATTLE, WASHINGTON



Disconnect Switch

(21) Line Material Co., 700 W. Michigan St., Milwaukee 1, Wis.

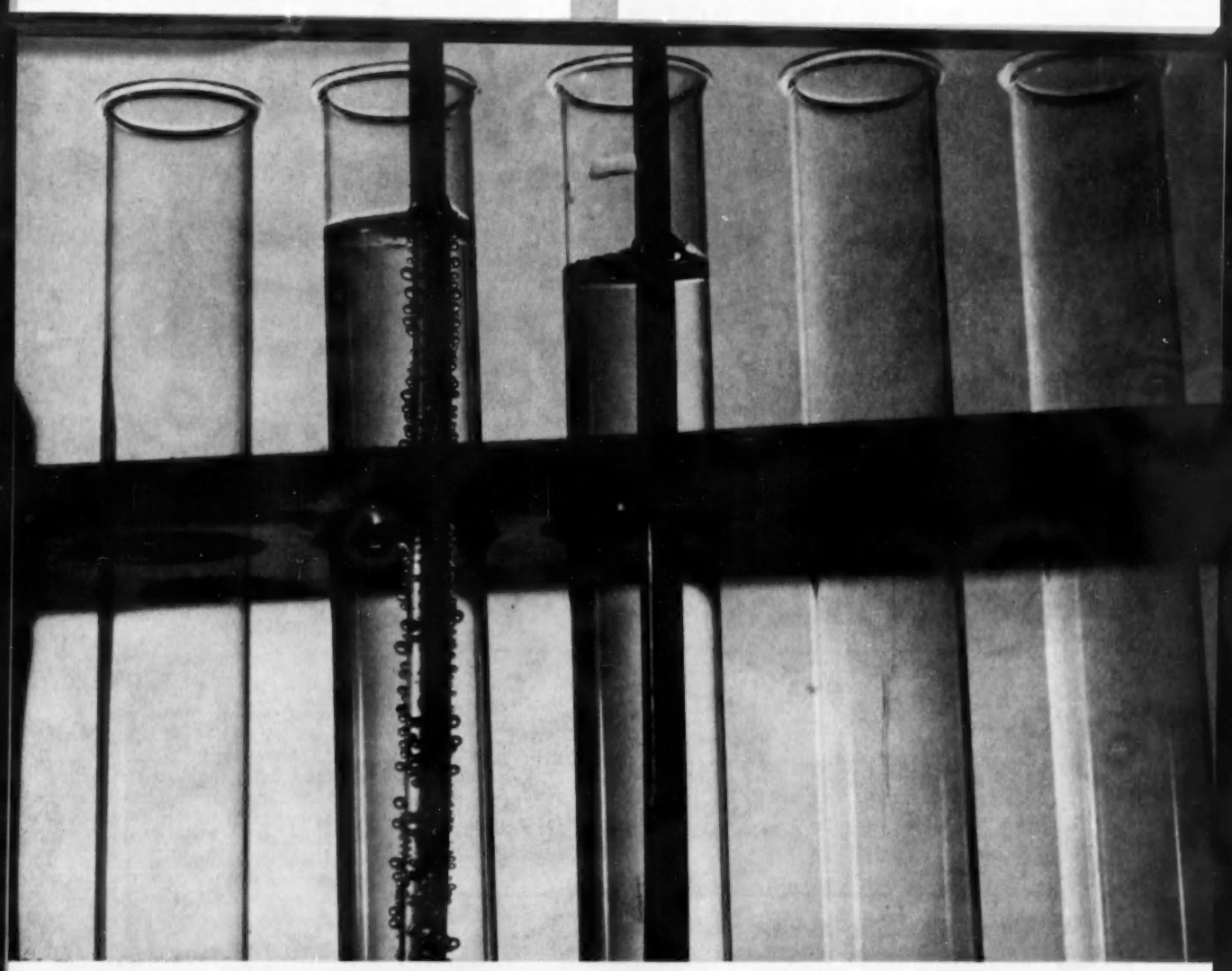
Trouble-free service in sectionalizing, disconnecting or by-passing applications are stated advantages of this new product. It is a 1,200-amp, outdoor, group-operated, vertical-break disconnect switch, rated 7.5 through 69 kv. Designed for either pole or structure mounting in a horizontal, vertical or inverted position. A horizontally mounted switch is furnished with horn gaps for interrupting light load, magnetizing or charging currents. Silver-to-silver high-pressure contacts are field adjustable.

Adjustable Growler

(22) Martindale Electric Co., 1306 Hird Ave., Cleveland 7, Ohio

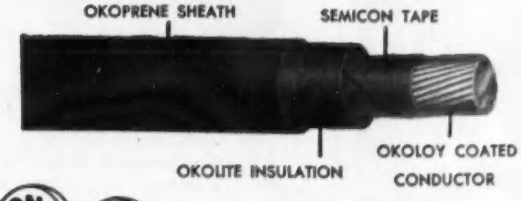
Armatures from 1 to 18 in. diameter can be tested with this type B-1-M growler that features adjustable jaws. The manufacturer reports that it is constructed so the armature is always suspended above the center of the jaws, regardless of the setting of the jaw opening. This feature is said to prevent tipping.

(23) RECEPTACLE — Compactly designed for extra wiring room in the outlet box, this single ground-type receptacle is rated 20 amp, 250 v. It is cataloged as the S-395 and can be used in single phase with a separate ground and in three-phase wiring, or it can be used in single phase and grounded to the yoke. Additional information available from Slater Electric & Mfg. Co. Inc., Woodside, Long Island, N. Y.



Why Okoloy conductor coating outlasts "tinning" 2 to 1

The conductors above are immersed in a solution of sulphuric acid. Bare copper conductors are quickly attacked by corrosive chemicals such as sulphur acids formed when moisture combines with sulphur and sulphur compounds frequently used in the vulcanization of rubber insulations. The conductor coating must, therefore, be highly resistant to it.



The copper wire on the left is coated with tin, the most commonly-used conductor coating material. The acid attacks it immediately. The other copper wire, unaffected by the acid, is coated with Okoloy. Okoloy, a virtually pure lead coating, has been used by Okonite since 1928 to coat all copper conductors for rubber-insulated cables. Of all the common metals, lead is least affected by sulphuric acid and other corrosive chemicals. *Okoloy outlasts even the best "tinning" at least 2 to 1.*

* * *

Next time you buy a rubber-insulated cable, *make sure* the insulation and conductor are protected by Okoloy conductor coating—*not* tin.

The Okonite Company, Passaic, N. J.

Okolite-Okoprene cables are made by the strip-insulating process

OKONITE SINCE 1878 ***insulated cables***

2889

GET SET FOR EARLY FALL HEETAIRE Sales... and GET

A MARKEL $14.95 YARD LITE FREE!

The "Profit-Ten" Heetaire and FREE MARKEL Yard Lite Package Gives You a BIG PROFIT MARGIN!

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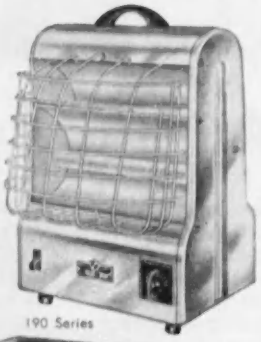
110 Series

HERE'S WHAT YOU GET!

SERIES NO.	QUANTITY	MODEL	TOTAL DEALER PRICE	TOTAL LIST PRICE
140	1	140T or 141T	$10.35	$15.95
	1	145 or 146	8.78	13.50
	1	143	8.30	12.50
110	1	117T or 118T	12.15	18.95
190	2	197T or 198T	32.00	49.90
	3	195 or 196	41.85	65.85
130	1	137T or 138T	24.65	39.95
	10		$138.08	$216.60
#1803 YARD LITE	1		FREE	14.95

Remember, one $14.95 YARD LITE FREE with Every "PROFIT-TEN" Package!



190 Series

We will ship the "PROFIT-TEN" package and the FREE YARD LITE direct from the factory PREPAID! Order from your distributor today!

THIS OFFER GOOD ONLY ON ORDERS RECEIVED THRU AUGUST 30, 1955 . . . *ORDER NOW!*

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NEO-GLO HEATING ELEMENTS

NOW — NEO-GLO Heating Elements in Every Portable FAN-GLO HEETAIRE Guaranteed for life!

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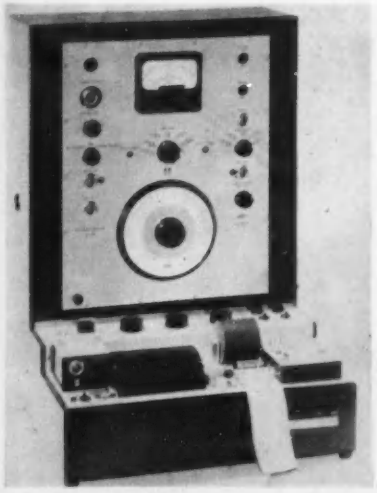
LA SALLE PRODUCTS, Inc.

DEPT. EW, BUFFALO 3, N. Y.

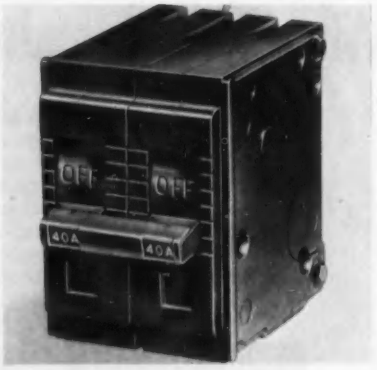
Export Dept. 15 Moore St., New York 4, N. Y.



Vibration Analyzer

(24) Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio

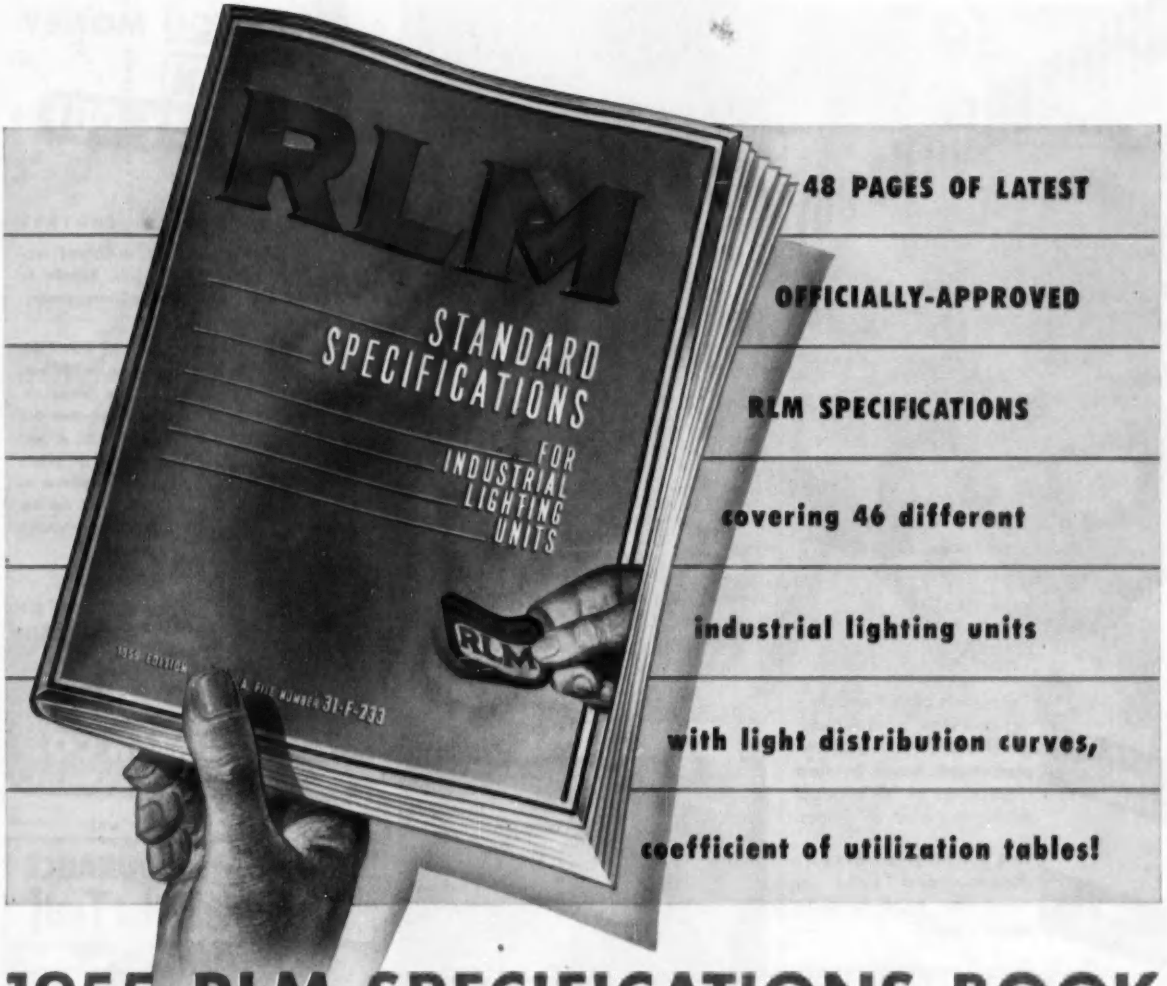
This instrument, through the use of a narrow frequency band analysis, provides physical measurement data that are easily correlated to subjective tests for loudness of sound or the intensity of vibration, according to the manufacturer. Known as the Third Octave Spectrum Analyzer Model BL-2109, it can be combined with the company's level recorder model BL-2304 for continuous monitoring and recording of the analysis.



Two-Pole Circuit Breaker

(25) General Electric Co., Trumbull Components Dept., Plainville, Conn.

Two-pole units with an interlocking trip mechanism assembled as a single unit make up this new circuit breaker for use in panelboards and load centers. Available in six ratings from 10 to 50 amp for 120/240-v a-c operation. Has an interrupting rating of 5,000 amp a-c, listed by Underwriters' Laboratories.



1955 RLM SPECIFICATIONS BOOK

Complimentary Copies Are Available... Get Complete Details on

12 ADVANCEMENTS IN INDUSTRIAL LIGHTING!

Today, specification of industrial lighting units bearing the RLM Label is more important than ever. When you get your copy of the new 1955 Edition RLM Specifications Book and read more about the twelve advancements listed here, you will see why. You will read how these advancements improve overall efficiency up to 5%; relieve brightness contrast two ways; reduce glare; reduce light losses; provide greater ease of maintenance and safety from electrical hazards; make installation easier and less costly; reduce the amount of trapped light; reduce lamp failures; prolong life of unit.

In addition, you will find many helpful tips on lighting equipment specifications in the expanded introductory pages. Here you will also find many of the "hidden benefits" of the new advancements in RLM Specifications. If your work is at all concerned with industrial lighting equipment, you should not be without this valuable reference work.

Your copy of the 1955 RLM Specifications Book is available without cost or obligation. Please address request on your letterhead to:

RLM Standards Institute, Suite 815, 326 W. Madison St., Chicago 6, Ill.

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WITH A COMPLETE LINE OF CARBONS, MOTOR & GENERATOR BRUSHES PLUS KARAK CUSTOM PROCESSED CARBON MATERIAL

MOTOR AND GENERATOR BRUSHES — Thousands of manufacturing concerns, both for original equipment and replacement have availed themselves of this product during the past 39 years.

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"KARAK" CUSTOM PROCESSED MATERIAL — Does "practically everything" for industry. It has mechanical properties—electro-mechanical properties — thermal properties

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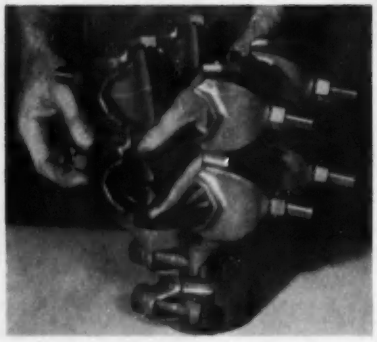
THE OHIO CARBON COMPANY
12508 BEREA ROAD • CLEVELAND 11, OHIO

Flashing Electric Flare

(26) Buffalo Weaving & Belting Co., Alliance, Ohio

This battery-powered flashing flare is reported to be visible and attention arresting at a distance of 1,500 ft and operates 22 continuous hours without loss of brilliance. Cone is 19 in. high. Inquiries should be sent to Earl Bacon at the address above.



Transformer Connector

(27) Anderson Brass Works Inc., 700 44th St. N., Birmingham, Ala.

This connector was designed to meet a specified need for connecting four conductors from 500 MCM to 2,000 MCM in a vertical or horizontal plane to a 3-in., 12-thread bushing stud. The connector is designed to avoid later replacement because of reconductoring and for use with large power transformers. Clamping members can be tightened on cables in a vertical take-off position, or they can be rotated 90° to clamp horizontally.

Use Coupon, Page 60, to secure manufacturer's literature on these products

SAVES YOU MONEY

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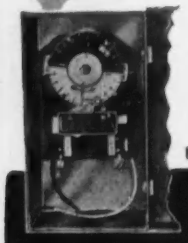
TORK

ASTRONOMICAL CONTROL

Now ready, as a kit, to fit any regular model on the job. Simple to change. Saves time—Saves money.

ON AT SUNSET—OFF AT SUNRISE or a fixed time, 10:30 p.m. to 1:30 a.m.

• Tork Time Switches require no attention—this feature $12.00. A must on all public safety lighting. An economy on all commercial lighting. Tork is fully automatic. No one forgets.



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IN THE FIELD as in laboratory tests . . . *Crapo* Galvanized Steel Strand proves itself capable of withstanding severe punishment. Steel's inherent strength and durability are combined with definite economies in every size and grade of *Crapo* Steel Strand. You'll find the heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Contact your jobber of *Crapo* Galvanized Products or write direct for further information!

INDIANA
STEEL & WIRE COMPANY
MUNCIE, INDIANA

"Naturally, I'm figuring on Day-Brite —I've found it pays"

James W. Potter, Potter Electric Service, Urbana, Illinois

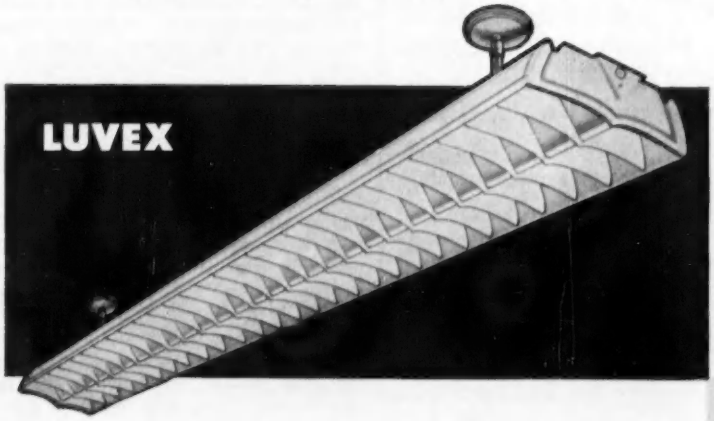
"I'll tell you why I am so strong for Day-Brite fixtures:

"In the first place, Day-Brite makes an out-and-out quality product. All the time. And that counts for a lot, because when I install Day-Brite fixtures I can count on customers who are completely satisfied. That leads to more business for me—you know, nothing beats a satisfied customer.

"On the job, Day-Brite fixtures are a cinch to install. Because they're so easy to hang and line up, I save a lot of time. And, as the old saying goes—'Time is money.'

"Another thing: Day-Brite deliveries are OK. The fixtures arrive in good shape—they're complete with all fittings and fasteners. Shipping cartons are coated on the inside with a special wax film to protect the fixture finish against abrasion and damage. I can always be sure of a 'factory-fresh' fixture.

"There are a lot of other things about Day-Brite fixtures that make them preferred, not only by contractors, but by architects and owners, too. Ask your Day-Brite representative to tell you more."



Attention to detail makes Day-Brite Fixtures "decidedly better." For instance, note the overall rigidity of LUVEX® fixtures. They maintain alignment even in areas near shop work where vibration is present.

SEE!

EXAMINE!

COMPARE!

Day-Brite Lighting, Inc., 5412 Bulwer Ave., St. Louis 7, Missouri. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

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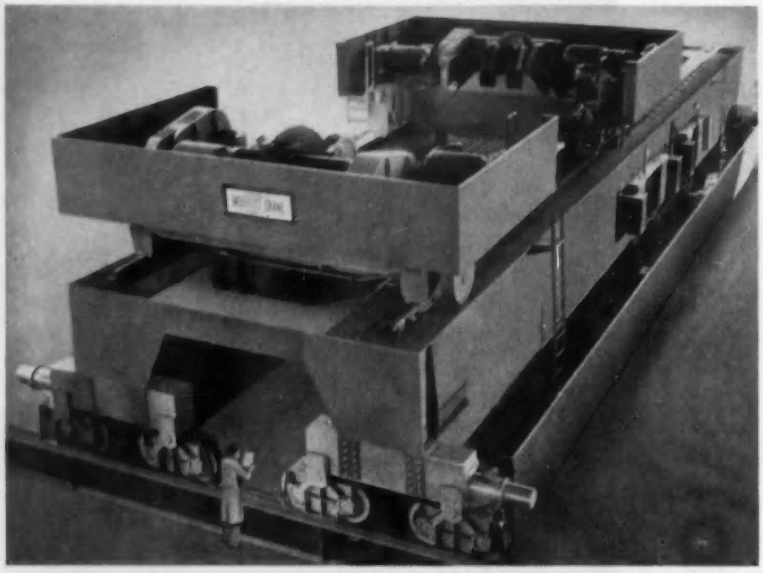
NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT



OVERHEAD CRANES — ¼ to 650 Tons

Shop fitting a MOFFETT overhead crane built for the power house at Garrison Dam. Two of these huge machines will work together to handle loads up to 600 tons. Complete and careful shop assembly and coordination of deliveries to your erection schedules insure easy, confusion-saving installation on the job. For a "plant individualized" crane, consult MOFFETT NOW!

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SURGICAL LINE CLEARANCE BY DAVEY

Davey is doing line clearing for 12 Public Utilities on the Pacific Coast —most of them served continuously for over 20 years. Davey specialized equipment and efficient methods save money . . . Davey surgical pruning benefits trees—builds goodwill.

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DIVISION OF

DAVEY TREE SURGERY CO., LTD. OF CALIFORNIA

Russ Bldg., San Francisco, SUtter 1-3377

Story Bldg., Los Angeles, TUcker 1929

Booster Transformer

(28) Hindle Transformer Co. Inc., Woods Church Rd., Flemington, N. J.

This new line of voltage-booster transformers provides protection against the hazards of low voltage, featuring transformers for all popular-size motors from ⅓ hp to 1½ hp. Recommended by the manufacturer for installation in the input side ahead of appliances and other devices for complete protection.

Submersible Pump

(29) Kenco Inc., 1125 N. Ridge Rd., Lorain, Ohio.

This submersible pump for cable and transformer vaults, manholes and other sumps is designed for automatic operation under water. Both motor and pump are enclosed in a single watertight case, the manufacturer reports. Water rising to a predetermined height in the sump causes an air head to flex a diaphragm in the switch, closing the switch contacts and starting the motor. Floats and switch plungers are eliminated. Water level allowed is adjustable from 9 to 16 in. on standard models; up to 7 ft on special models.

Corona Detector

(30) Sunshine Scientific Instrument, 1810 Grant Ave., Philadelphia, Pa.

Corona discharge in high-voltage rotating apparatus, such as generators, is detected by this device. The unit consists of a probe mounted on the end of an insulating pole, a control unit and cables. It is connected to a standard oscilloscope for a visual corona reading. The equipment is portable.

Explode-Proof Fittings

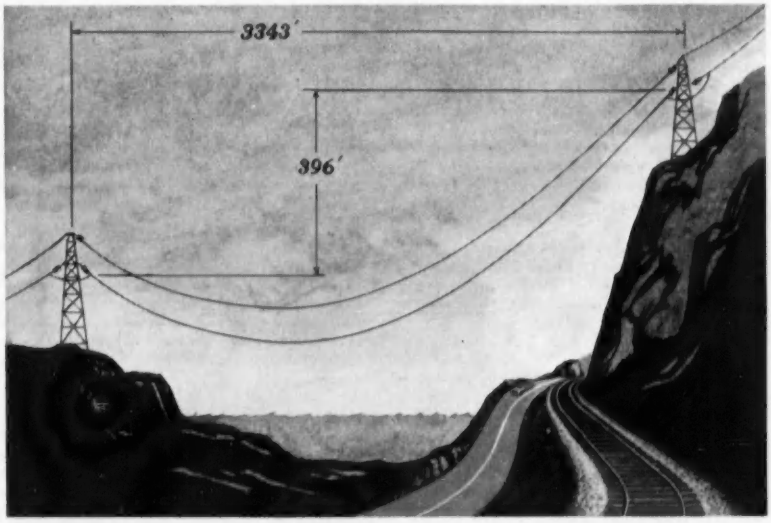
(31) Revere Electric Mfg. Co., 6007 Broadway, Chicago 40, Ill.

Individual sealing of each conduit against dangerous vapors and simplified wiring are stated features of this manufacturer's new explosionproof junction boxes. Said to be especially adaptable to service station applications, the boxes are available in two designs, one for curb installation, one for flush installation. Both boxes are cast in one piece of aluminum alloy and have conduit stops.

(32) **BENDER DIES**—Six new dies have been introduced by Hossfeld Mfg. Co., Winona, Minn., for their Hossfeld Universal Iron Bender. One of the lines is a 90° conduit die for bending standard pipe and rigid conduit. Available in seven sizes from 1½ in. down to ⅜ in. Another, for thinwall conduit, has sizes from ½ in. to 2 in.

How Kaiser Aluminum engineers helped Metropolitan Edison solve construction problems

A. C. LETTS (right), well-known Kaiser Aluminum construction specialist, tells how Kaiser Aluminum engineers worked with the Metropolitan Edison Company during the construction of a key transmission line involving a major Susquehanna River crossing.



"THIS IS ANOTHER INSTANCE where ACSR (Aluminum Conductor Steel Reinforced) proved its superiority in the transmission field. It is 104.84 miles of 230 KV transmission line crossing rough mountainous country with three intermediate substations plus a river crossing requiring a level ground span of 3343 feet with a difference in conductor attachment elevation of 395.69 feet. The span is one of the longest river crossings east of the Mississippi River. (See above.)

"The Metropolitan Edison line in addition to the river crossing consists of a single circuit of 27.44 miles of 795,000 CM—30/19 ACSR and 76.77 miles of 1,033,500 CM—54/7 ACSR with an average span of 1100 feet between steel towers. The ACSR phase conductors were arranged in horizontal configuration with two 7/16" EHS steel shield wires located 20 to 25 feet above the conductors depending upon the structure design to give a shielding angle of approximately 30 degrees.

"Ball and socket type 10" diameter insulators were used, with suspension string insulator assemblies consisting of 16 insulators. Dead-end strain assemblies consisted of double strings of 18 units. Armor rods were used at all points of suspension.

Kaiser Aluminum Recommendations

"Much of the conductor loading and sag-and-tension data was supplied by the engineering department of Kaiser Aluminum for the ruling spans selected by Metropolitan Edison Company engineers.

"The reels were set up on the low side of the Susquehanna River and the conductor pulled above the water and up the mountainside in one continuous operation. By the strategic use of rider poles, the operation of roads, railroads, and energized lines was not hampered during conductor installation."

OUR UNSURPASSED SERVICES AVAILABLE TO YOU!

You can take full advantage of Kaiser Aluminum services now—as hundreds of power companies are doing.

Our engineers will personally work with you in the planning and design of overhead lines, furnish technical information, help keep you up-to-date on latest construction techniques, help solve specific installation problems, and assist you in selecting proper accessories and fittings.

In addition, experienced Kaiser Aluminum construction specialists will work with your crews right in the field, demonstrate ways to speed installations and cut costs.

You make big savings with Kaiser Aluminum conductor!

By converting to Kaiser Aluminum conductor you can save thousands of dollars a year! Check the chart below for typical aluminum and copper cost comparisons.

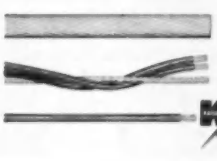
Compare your savings—Kaiser Aluminum vs. Copper Weatherproof Conductors:

	Per 1000 Ft. Lbs.	Cost
#6 Solid Copper TBWP*	112	$ 50.21
#4 Solid Alum PE (2/64)	48	26.90
#4 Solid Alum Neo (3/64)	64	26.90
#2 7 Strand Copper TBWP*	270	126.18
1/0 7 Strand Alum PE (4/64)	141	70.80
1/0 7 Strand Alum Neo (4/64)	172	70.80
2/0 7 Strand Copper TBWP*	522	223.31
4/0 7 Strand Alum PE (4/64)	261	138.00
4/0 7 Strand Alum Neo (4/64)	306	138.00
4/0 7 Strand Copper TBWP* 336400 CM, 19 Str. Alum PE (4/64) 336400 CM,	800	340.64
19 Str. Alum Neo (5/64)	388	216.00
	469	231.00

June 1, 1955 prices based on 30,000#—F.O.B. Destination
*URC Copper Triple Braid Weatherproof

For complete information contact any Kaiser Aluminum office in principal cities or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc. *General Sales Office*, Palmolive Bldg., Chicago 11, Ill.; *Executive Office*, Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum



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Polyethylene & Neoprene Covered Conductor • ACSR Triplex • Quadruplex • All aluminum conductor Rectangular, Solid Round and Tubular Bus

KNOB and TUBE WIRING RUNS COOL AND CARRIES GREATER LOADS FROM 33% TO 100% MORE

HOT ? If you want your wiring to run **COOL,** install Knob and Tube Wiring. It's cooler—it's safer—it carries greater loads . . . from 33% to over 100% *more* than other methods. It's the answer to your adequate wiring problems. See NEC Tables I and II on conductor carrying capacities.

Specify Porcelain Products' Knobs and Tubes for better Knob and Tube Wiring.

61 years PP

Porcelain Products, Inc.
FINDLAY, OHIO

BULLETINS ETC.

(33) **TEMPERATURE CONTROL SYSTEMS** — An educational bulletin on temperature control systems is now available from Barber-Colman Co., Wheelco Instruments Division, Rockford, Ill. Control terminology and rules to guide the selection of a proper method of control for process characteristics is included in the information. It is Wheelco Bulletin F 6149-2.

(34) **CONTACTORS AND RELAYS** — Allis-Chalmers heavy-duty d-c contactors, including the new type 522 units, and control relays for steel mill and similar heavy industry applications, are described in a new bulletin released by the company. Bulletin No. 1488171A is available by writing to the company at 939 S. 70th St., Milwaukee, Wis.

(35) **AMERICAN STANDARDS**—A list of American standards, 1955 edition, now available, includes 272 electrical standards. Free from the American Standards Assn., 70 E. 45th St., New York 17, N. Y.

(36) **RELAY SELECTION**—How to select a mechanically or magnetically held relay is shown in a publication offered by Automatic Switch Co., 391 Lakeside Ave., Orange, N. J. Ask for publication No. 553.

(37) **BUSHING SERVICE**—A series of technical service bulletins detailing various phases of high voltage apparatus bushing operation is now available from Locke Department, General Electric Co., Box 57, Baltimore, Md. Ask for bulletin No. 1.

(38) **PRICE CATALOG**—Electrical Specialty Co., 158-168 11th St., San Francisco 3, Calif., has published its latest price catalog.

(39) **PERSONNEL TESTING** — Tests and other materials for use in personnel selection and training are described in the newest edition of the Industrial Catalog just issued by Science Research Associates, 57 W. Grand Ave., Chicago 10, Ill.

(40) **ENTRANCE EQUIPMENT** — A two-color, 16-page booklet describing a new line of fusible service entrance equipment is available from the General Electric Co.'s Trumbull Components Dept., Plainville, Conn. The bulletin explains the features of seven basic types of fusible service entrance devices for home, farm, commercial and light industrial applications. Booklet GEA-6286 also contains information on merchandising aids available for the use of electrical contractors.

(41) **TEST INSTRUMENTS**—Multi-Amp Corp., 10 Third St., Newark 7, N. J., is offering new literature outlining a special series of high current test instruments.

(42) **CONDUIT** — National Electric Products Corp., Gateway Center, Pittsburgh, Pa., has reproduced test data sheets showing how its Superduct conduit stands up under the corrosive attacks of salt spray, sulphuric acid, caustic soda and exposure to excessive heat. Color illustration shows conduit before and after exposure.

(43) **STRAINERS**—Photos, descriptions, dimensions, capacities, installations and pertinent engineering information about S. P. Kinney Engineers Inc. strainers are contained in a 13-page brochure now available from the company. Address requests to 201 2nd Ave., Box 445, Carnegie, Pa.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
68 Post St., San Francisco 4, Calif.

Not good after October 1

Please send me, without obligation, the new product information or catalogs:

If described in Product News, circle item number

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* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

ANOTHER EXAMPLE OF Cope EFFICIENCY...

COPE 70,000 SERIES CABLE TROUGH WITH THE BUILT-IN COUPLER

now available in 12' length

33% fewer connections

The new Cope 70,000 Series Cable Trough with the built-in Coupler is now available in 8, 10, and *12 foot lengths,* and affords you 80% SAVINGS in assembly time, PLUS 33% FEWER CONNECTIONS.

These features alone mean real savings for you, in time and money.

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Seattle 1, Wash. Fred W. Carlson, 2307 Fifth Avenue

CARCO

Steel Light Poles

As part of a continuing program of improved street lighting, the City of Berkeley installed 26 Carco anchor base steel light poles on San Pablo Avenue and, shown above, 46 on University Avenue. Mounting height is 30′ 6″ with 6-foot underbraced brackets. On both streets, poles are 110 feet apart in staggered positions with poles on all four corners of major intersections. The previous underground wiring system was used. An access hand-hole modification on lower portion of poles permitted easy connection to existing wiring. 10,000-lumen luminaires give present nighttime readings of 1.5 foot-candles on San Pablo and 2.0 foot-candles on University. Luminaires can be changed to 15,000 lumens when increased illumination is needed.

50th ANNIVERSARY 1905 1955 PACIFIC CAR AND FOUNDRY COMPANY

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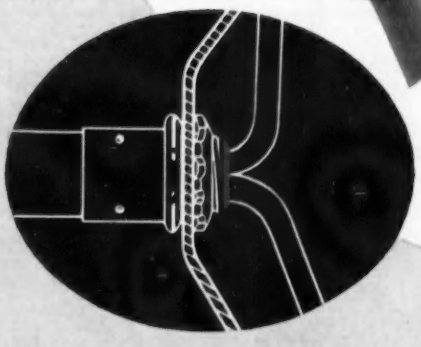

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ELECTRA'S HUSBAND

"YOU folks ought to be happy that the Dixon-Yates controversy is off the front pages of the newspapers," Electra observed one evening during a lull in the dinner table conversation. Knowing something of her mental processes, I presumed she made the remark to nettle our guest—a very forthright and vocal critic of what he terms the "timidity of private utilities" and the "blindness of Republican party leadership."

"Yes, it was a great victory for private power," I commented. "And it takes the Administration off the hook. The Democrats were sure they had a popular political issue for 1956. Now they won't."

"Say, who are you trying to kid?" our guest observed. "Before anybody hails the cancellation of the Dixon-Yates contract a victory, he should go back to his ancient history books and look up the references under the heading 'Pyrric' in the index. Unless I miss my guess, it will turn into a tragic fiasco."

"I don't remember my ancient history that well," Electra admitted naively. "What is this about Pyrric?"

"In 279 B.C. Pyrrus, king of Epirus, led a vast army against the Romans at Heraclea, near the Gulf of Tarantum," our guest explained. "It was the first great battle between Greeks and Romans. Pyrrus won, but at so great a loss of men and elephants that he observed that the cost of the victory was so great that he doubted if he would be finally successful in the war. He was right for, although he won other battles, he ultimately was decisively whipped. The Dixon-Yates so-called victory can prove equally empty in the battle between private and public power."

"I can't follow you," I argued. "The electric service responsibility for the city of Memphis is shifted from the federal government back to the local interests, where it belongs under the Administration power policy declaration. Also TVA is relieved from the job of using federal taxpayers' contributions to furnish power to Memphis and to build up its system."

"Sure, sure," our guest agreed heartily. "All of that appears fine now. But tell me what the odds are on the probability of a chain of events something like this: Suppose that the city of Memphis, through appropriate spokesmen, aided and abetted by such able campaigners as Senators Kefauver and Gore and the whole coterie of public power advocates, begins shortly to squirm and scream under the 'intolerable burden'—financial, administrative, engineering and operational—of their new $100,000,000 plus power plant. There would be increasing references to the despicable tactics of the federal government and the Republicans in particular that 'coerced' the city in the power generating business.

WILL IT BE A PYRRIC VICTORY?

The great 'sacrifice' that Memphis has made to protect the honor and glory of the South from the evil depredations of the private power interests will be dramatized and publicized."

"Oh, now, you're overdramatizing," I insisted. "The people of Memphis would never buy any such package as that."

"And maybe you're being just a little bit self-satisfied and complacent," Electra mused. "It's an unfortunate habit that you and some of your friends have. Let Tom have his say."

"Thank you for pointing up a fact that traps your esteemed spouse and many of his friends so frequently," our guest said to Electra. "It's a fact that the proposed Memphis municipal plant will not be adequate to handle the area's peak demand in 1958, the year when it is scheduled to reach full production. So Memphis will still have to continue to buy power from TVA. Thus TVA will be ready and willing to assume the role of a tolerant, long-suffering but patient saviour of the area.

"Then comes the subtle move," he continued. "When Memphis' plight is sufficiently dramatized, there will come a suggestion, perhaps even a demand in the form of a mandate of the people, to have TVA participate in the expansion of the Memphis plant—say the addition of another 200,000- or 250,000-kw unit. This will be pointed up as the obviously sensible solution to the plight of poor Memphis, so sensible in fact that even the most rugged private enterprisers will be reluctant to challenge it."

"That sounds perfectly reasonable to me," Electra commented.

"Then comes the denouement, as they say in the mystery stories," he proceeded. "With TVA once again in partnership with the city, the next obvious step presents itself. Arrangements will then be made to have TVA take over the whole plant, lock, stock and barrel, achieving out-and-out ownership either by issuing its own revenue bonds, taking over the Memphis bonds or, most simply, by dipping into Uncle Sam's copious purse. TVA then sits on the banks of the Mississippi possessed of an additional 600,000-kw or larger steam plant, with some surplus disposable power. Across the river sits disconsolate Arkansas, 'dominated' as the zealots say by private power, ready to be 'liberated.' "

"You draw an extreme and unlikely picture," I expostulated. "I don't think it will be that way."

"Do you want to bet?" our guest queried. "I'll even give you a time table for this little drama, with due consideration for the national election results. If the Democrats win, the final scene will be ready for staging no later than 1958. If the Republicans are returned to office, it might take until 1960."

"So far as I'm concerned, I wouldn't wager a Roosevelt dime," Electra averred in agreement.

"Let's hope that this speculation of yours is unduly pessimistic or naive," I said grudgingly.

"Okay, but after witnessing 19 years of Dixon-Yates type 'victories for private power,' it's hard to work up an appetite for victory banquets," our guest concluded. "Ike's pallid reaction that 'this is what we wanted all of the time' is much less compelling than the vivid and incisive extemporaneous remarks of the late Wendell Willkie at the 1937 EEI convention. He foresaw the actual score then and he courageously called some of the plays. He won some victories and lost some fights, but he always knew he was in a war. We in the private power business should never forget that this same war is hotter now than it was then."

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Offers These Amazing Physical Properties

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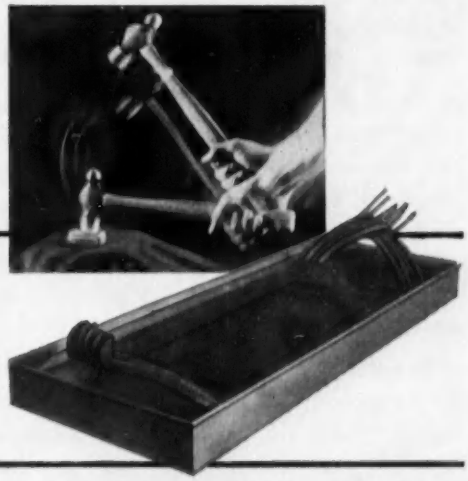
Silco-Flex insulation employs a pure silicone rubber combined with specially developed application techniques to produce an insulation unmatched by any other in use today.



● **Flexibility and Resilience** — *Silco-Flex* insulation remains flexible and resilient indefinitely. It is especially resistant to mechanical abuse and to stresses of overloading, rapid starting and stopping.

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● **Abrasion Resistance** — Samples of insulation at right show effects after sandblasting with 90 grit aluminum oxide and 100 psi air for one minute. Nozzle-to-sample distance was six inches, thickness equivalent to 2300-volt insulation. Note difference in abrasion!

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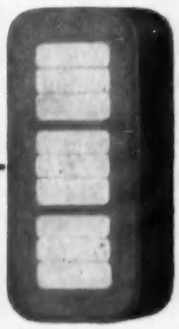

Other Advantages include exceptionally good thermal stability and chemical inertness. *Silco-Flex* insulation is also a much better heat conductor than ordinary electrical insulating materials. Moreover, enclosures now required to protect windings from moisture and abrasion may be eliminated in many cases.

New *Silco-Flex* insulation is immediately available for all Class H form-wound coils and for Class A and B windings operating under selected service conditions. For complete information, call your Allis-Chalmers representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

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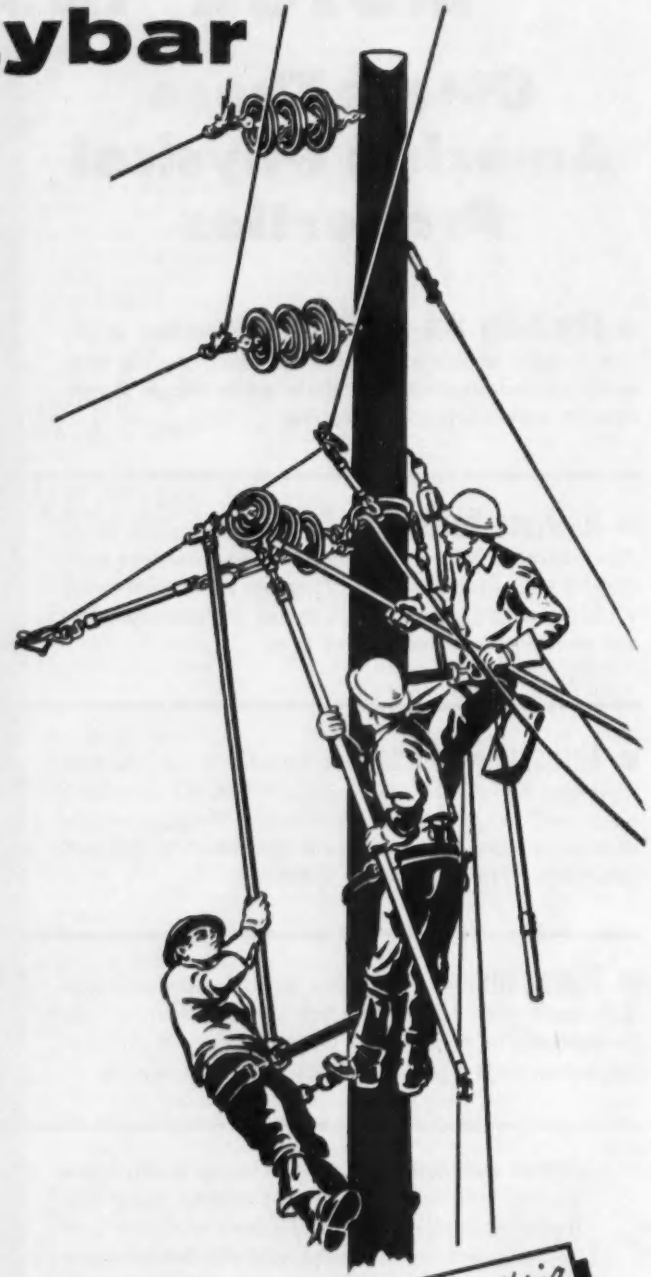

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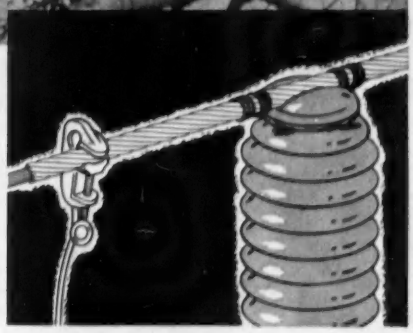

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LATEST POWER CIRCUIT BREAKER development is the new 750-mva metal-clad unit which offers a 50% increase in capacity with only a 6% increase in floor space. New unit will help combat problem of lack of sites when new substations must be built or existing ones up-rated.

Metropolitan load growth squeezes substation sites

New 750-mva, 13.8-kv breaker designed to pack more capacity in smaller area

Facing many electric utilities is the problem of how to serve the concentrated load in metropolitan areas. The same economic growth which builds load in these areas is reducing rapidly the number of available substation sites—and making remaining locations extra costly. Naturally, serving this load means higher interruption capacity which previously has required relatively bulky equipment.

HIGHER CAPACITIES

To battle this problem, General Electric has designed new substation equipment which will help utilities get more capacity in existing substations and in new ones; more capacity per square foot.

NEW BREAKER

Typical of G-E engineering accomplishments is the first 750-mva, 13.8-kv Magneblast breaker and metal-clad switchgear which has successfully passed final design tests at G.E.'s High-capacity Switchgear Development Laboratory and is to be shipped in early 1956. Rated 1200 and 2000 amperes, the new metal-clad unit will represent a 50% increase in interrupting capacity over present 500-mva equipment, with only a 6% increase in floor space.

For system planners, such developments as this by General Electric offer new tools for meeting the ever-important challenge: the right combination of the right apparatus to ensure the most economical supply of power. General Electric Company, Schenectady 5, New York. 301-302

MORE POWER TO AMERICA

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ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S. VOL. 115 No. 2 AUGUST 1955

There is dynamic long-term growth in the

West's Changing Business Environment

Dr. Weldon B. Gibson*

Director of Economics Research
Stanford Research Institute
Menlo Park, Calif.

Here Is What Economists Forecast

By 1975 the West will have:

- **Population increase of 70%**
- **Rise in income level of more than 70%**
- **Increased economic activity of 80 to 100%**

To keep pace industry must have

- **Constantly increasing productivity**
- **New and better products and services**
- **More and more capital for expansion**

During the past 15 years a number of significant and far-reaching changes have occurred on the Western business and industrial scene. They can be grouped into four rather distinct stages.

The military spending program of the early 1940s ushered in the first stage of a rapidly expanding Western economy and in five short years brought greater increases in economic activity than had occurred during the preceding two decades. One example of this war-stimulated upsurge may be found in population. The number of people in the 11 Western states rose about 3,000,000 between 1940 and 1945—as great an increase as occurred during the preceding 15 years. The second big change on the Western scene lasted for five years; we have come to know it as the postwar period —from 1945 to 1950. Contrary to many expectations, the Western economy contained its spectacular growth as private business investment replaced the wartime spending programs. The West completed a decade of growth exceeding anything that has occurred in this country during the present century. This amazing development was highlighted by almost a two-fold rise in regional income even after changes in the value of the dollar are considered.

Development Unparalleled

It was apparent by 1950 that the West was on the move in an economic and industrial sense. Then there began a second wartime development stage brought on by the Korean incident. Population, regional income, defense spending and private investment set new records every year. As the military program leveled off in 1954, the West entered a new time of change, which some have called a normal or natural economy. This means simply that the natural economic forces unleashed in the West took over the lead to bring on ever-increasing business and industrial activity. We are witnessing once again an economic development unparalleled on the American scene . . . I suggest that we think of the West as now being in a dynamic long-term growth stage that will take us onward and upward to a vastly different business environment.

There are essentially two themes in this discussion. The first deals with a long-term view of the West's development over the past two or three decades and emphasizes that we have for many years been in an expanding situation—perhaps more than most people think. Somehow, in such a view the great depression and the wartime periods fall into a basic pattern even more significant than our postwar pattern. The second theme looks to the future and speculates on some of the changes ahead in our dynamic situation. It is within this framework that can be seen more clearly some of the fundamental changes occurring in the Western business environment. Many of the changes are recent but their causes are spread over many years. Certainly the impact of these changes upon business and industry is great.

We must have clearly in mind at the outset that a few forecasts today are based upon three assumptions. The first is that during the next 20 or 25 years the United States will not be involved in a major all-out war effort. We recognize at the same time that the nation probably will be supporting a sizable military program and that it may be involved in a number of relatively small-scale military actions.

The second assumption is that during this period we will not be subjected to sudden changes in technology of great magnitude. We expect, of course, that changes in technology will occur at an accelerating rate. However, we do not anticipate sudden changes that will disrupt continuity of growth in the over-all economy.

A Stable Economy

The third assumption is that we may look forward to a greater economic stability than has been the case in the past. By this we mean that the nation will perhaps not experience sudden and wide fluctuations in the business cycle but rather that the country will direct its economic affairs so as to minimize sharp peaks and valleys of inflation and deflation.

We realize fully that there are many unknowns in economic forecasting and

* Extracted from an address before Pacific Coast Electrical Assn., May 13, San Francisco.

that a variety of forces can cause any set of estimates to become unrealistic . . . However, it seems to me that one is on much safer ground when viewing the long-range situation as compared with day-to-day, month-to-month and year-to-year forecasts. There are fundamental trends and forces at work within our economy and they can be projected with some degree of confidence over a long period of time.

The future is indeed a promising one. My thesis is that during the next 20 years or so population of this country will increase about 40% and that our labor force will go up about 35%. Furthermore, with these additional people we will produce goods and services at a rate almost 70% higher than is the case today—and that this will be done with a shorter workweek. The thesis also calls for the population, expanded by 40%, to spend perhaps 65 or 70% more for personal consumption purposes. Business and industry will, of course, feel the effects of the increasing market. Industrial production may rise to a level 75 or 80% above today, with the greatest gain being in durable goods.

Perhaps it might be appropriate now to bring the long-range outlook somewhat closer to home, i.e., the 11 Western states. We might well ask ourselves: Where do we stand in the national picture? What is our outlook for the future? What may we expect on the economic scene during the years ahead?

We might turn first to a basic environment on the business scene—population. It is here that the long-term dynamic growth of the 11 Western states is so readily apparent. At the beginning of the decade of the Twenties, there were in all the West only about 9,000,000 people — approximately 8½% of the nation's population. The number of our people now stands at around 22,000,000. This means that we have multiplied at a rate of about 2.6% per year compared to the nation's increase of only 1% per year. This seems significant indeed for it indicates that the West has been on the move from a population standpoint for several decades.

But look at the future. One of our own studies shows that by 1975 some 37,000,000 or 38,000,000 people will be living in the West—in other words, an increase of 70% or more above our present population. This is certainly a meaningful contrast with the 40% increase estimated for the nation as a whole.

"Our economic studies indicate that real disposable income in the West will probably increase by 100% or more between now and 1975."

It is perhaps hazardous to speculate on the Western population situation for the year 2000. Could it be possible that we will increase in numbers to something in the order of 60,000,000 persons or around 28% of our country's people? It does in fact seem possible if we can trust the nation's population forecasters, and experience shows that they are almost always too conservative.

Emphasis Changed

These population estimates explain to some extent one of the fundamental changes in the business and industrial situation in the 11 Western states. We have changed the emphasis in our business affairs from a heavy dependence upon resource development to one on market development. The trend is not a recent one, it is a basic development over the past 30 years. It should continue at an accelerated rate during the next several decades. This means that more and more of our new and expanded business ventures will be brought into being to take advantage of a rising local market rather than a storehouse of natural resources. The trend to big Western markets is highlighted by the fact that the population of every large metropolitan area in the West is growing much faster than the average for all metropolitan areas in the United States as a whole.

We should take special note of the population situation in California. At the present time about one-half of the people in the West live in California. We may look forward to a 1975 situation in which 22,000,000 or more people will live in California—thereby giving the state about 60% of the Western population. This estimate has an obvious significance to business and industry planning ahead for operations in the West and to young men and women planning careers in the state. But there is an even more significant implication for business and industry engaged in nation-wide activities.

One of the basic measures of economic activity in any geographical area is the total income associated with the population level. Here again some fundamental changes have occurred in the West over a rather long period of time. During the past 25 years or so, regional income in the 11 Western states has increased at a higher rate than on the national scene. We now have an income level in the vicinity of $50 billion per year and there is every indication that it will rise within 20 years by more than the 70% level estimated for our population—even after taking into account changes in the value of the dollar. One recent study places the estimated increase at around 100% by 1975.

Consider for a moment the magnitude of our Western income by, say, the year 1975—even if we are only able to operate our economy as efficiently but no more efficiently than the country as a whole. There is a distinct possibility that here in the West we may realize during the next 20 to 25 years a level of economic activity—measured in industrial production, regional income, gross product and other such economic barometers—that will be far more than 70% higher than we are experiencing today, i.e., far higher than our population increase. The increase may well be double our present situation even without considering future changes in the value of the dollar.

Our economic studies indicate that real disposable income in the West, to mention only one measure, will probably increase by 100% or more between now and 1975. If this should occur, and I believe it will, the changes in business environment will be enormous. By comparison, the changes we see today will be minor indeed.

With all of these economic changes in the past, and as they are forecast for the future, has come a basic shift in

"We now have an income level in the vicinity of $50 billion per year and there is every indication that it will rise within 20 years by more than the 70% level estimated for our population . . ."

the West from a distributive to a manufacturing economy. More and more eastern as well as western companies are producing in the West for the local market, and indeed for shipment to the eastern markets. The greatest gain in manufacturing employment, during the past five years, is found in the West—about 20% or 5% or so higher than most other regions. We can look at this industrialization in another way. The added value of our manufactured products rose 70% between our last two census of manufacturers, compared to about 45% for the nation as a whole.

All of this onrush of events has transformed our business environment in many ways. The basic economy of the West has shifted from a resource to a market environment, from a dependent status to greater self-sufficiency, from an unbalanced state to a diversified situation, from a distributive to a manufacturing environment. These and other shifts in the Western economy soon began to put great strains on some of our supporting resources—water, petroleum, electric power, transportation facilities and even clean air, to name only a few. Many began to doubt our ability to sustain the dizzy climb in economic activity.

Can We Support This Upsurge?

How long can our economic upsurge go on at this dizzy rate? Can we find jobs for this many people? Do we have sufficient assets and endowments to support an economy of such size? What is our maximum rate of absorption? Will a growth of this magnitude outstrip our capacity to build roads, schools, colleges, community services and other supporting facilities? Can we cope with such problems as traffic congestions, smog control and water needs? Will there be adequate energy to meet the situation? Can industry maintain its investment program for new plants and facilities? These are some of the unanswered questions. I do not doubt that all of these problems can and will be solved.

We should, however, take a quick look at where industry stands today in its expansion to meet the needs of the growing Western economy. In making this quick review, let us keep firmly in mind that we now have around 15% of the nation's population, that by 1975 we may have more than 17% of the people, that by the year 2000 the proportion could go beyond 28%. Let us also keep in mind that there is every reason to expect an increase in economic activity during the next 20 to 25 years in excess of 90 or 100% of the present situation and probably much higher. . . .

"We have changed the emphasis in our business affairs from a heavy dependence upon resource development to one on market development."

We cannot expect to touch on more than a few industries but they can serve as examples. Consider the fact for a moment that only about 13% of the nation's energy is supplied here in the West. Or that we have only about 18% of the nation's installed generating capacity. Or that we produce only about 20% of the country's electric energy and that our rate of increase has been no greater than for the country as a whole. We might also mention that pig iron capacity in the West is less than 5% of that for the nation and that our steel ingot capacity is not in excess of 6% of that for the entire country. We might even take note of the fact that gasoline production in the West is only about 17% of that for the entire country. Many of our chemical products have a Western production rate of less than 10% of the nation's output. We produce less than 14% of the country's flour needs. Our cement production capacity stands at around 18% of that for the nation. We might take note also of the fact that we produce only about 18% of the country's wood pulp. On an over-all basis, we account for around 10% of the nation's value added by manufacture and we have about 10% of the country's production workers.

There are, of course, many commodities and articles on which Western production is far beyond our population proportions. Lumber, metals, fruits and vegetables are only a few of the examples. Furthermore, one might raise the point that the balance between our production and consumption is a better measure of where we stand in the West from an economic standpoint. This is, of course, true but there is one main point to make with respect to the present position of industry as a whole in the West. The point can be stated simply. During the past decade or so we have expanded our industrial activity along with sizable increases in population. But look at the future. Not only does our rate of growth remain high but the numbers are getting into the tens of millions rather than the tens or hundreds of thousands. While our country as a whole is expanding population by 40%, we will be expanding by 70%. While our national economy is expanding by 70% or so, we must expand at a much greater rate.

We may expect that the No. 1 problem of growth in the national economy, and particularly here in the West, is to somehow keep increasing our productivity so that we can in fact produce and sell more goods and services with less work, and with much more than a one-to-one ratio of economic increase to population increase. The ratio may even be as high as two to one.

We know, of course, that some of this increased productivity will come naturally or at least it seems to be this way over the years. But we now have even higher goals than in the past and so we must force some of the productivity increases. None of this will happen over night nor will it happen with sweeping developments.

More Automation

The increases will come in little ways — a mechanized shipping line here, a mechanized accounting system there, a more efficient production line on one hand, a streamlined selling operation on the other. Interwoven in all of these day-to-day developments will be a greater move toward more automation in production and in the office. The clerical burden in industry grows at a disturbing rate. The percentage increase in the number of office workers since 1900 is estimated to exceed the percentage increase in factory workers by a ratio of four to one. This is the problem now being approached with the aid of electronic devices. At the same time, we will continue to hammer away at production costs.

The over-all objective here is not new. We have always been alert in industry to ways of improving productivity, as the record clearly shows. But now we are wrapping the problem up with technology more than ever before. Perhaps achieving our productivity goals here in the West will require more than the usual vigilance and planning, even more than the country as a whole, because our goal is higher.

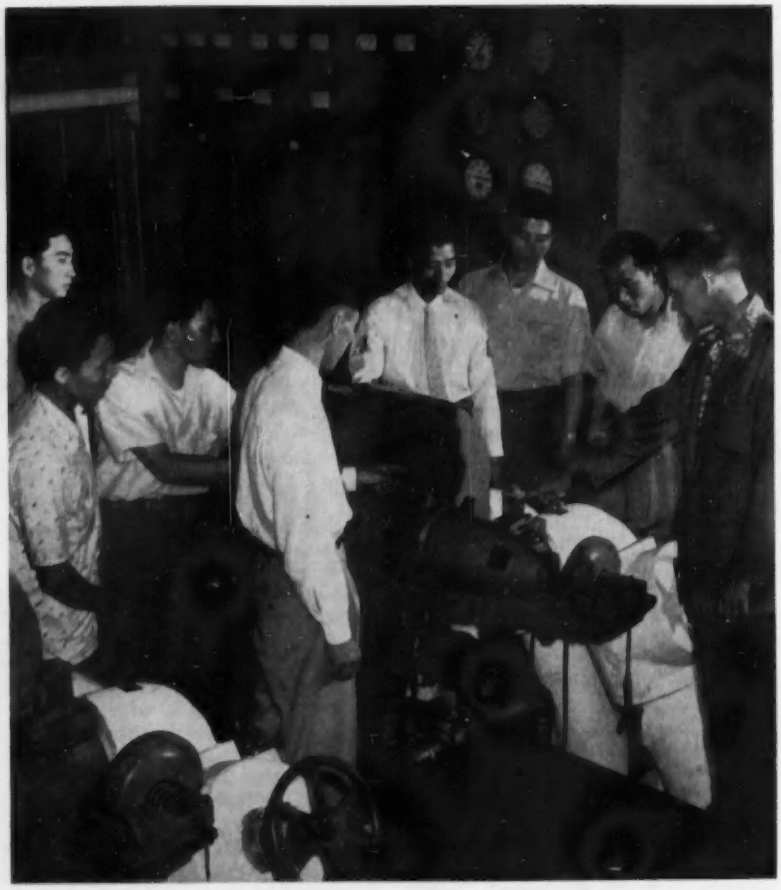
Turning to a second major point in the growth of Western industry—new products and services—it is easy for me to say that we must have new and better products . . . We know from history that about one-half of our nation's industrial products become obsolete or go out of the picture every 25 years or so. Can it be possible that by 1975 we will have a similar turnover? Here again we have a rough goal and it should be ample to occupy all of the

efforts of our research laboratories, scientists, engineers and new graduates from our colleges and universities.

To mention one more broad point in the growth of our Western economy, we can speculate on the possibility that 25 years hence our rate of new capital investment may be 50 to 70% or more above the present rate. Certainly we know that it will be much higher than it is today—and we are already setting new records each year. Business and industry must have money in great quantities if it is to make the new investment needed to provide new jobs and to increase productivity. The major source of this new money is business profits. It seems to me that the need for profits during the years ahead is greater than ever before. While this is industry's problem, there is a public interest involved. Our thinking, our governing, our economic philosophy must recognize the problem. For if industry is unable to make the advances upon which our proposition today is based then we are in for trouble. It is an old business fact that an expanding enterprise, whether a corner store or an industrial complex, must have an accelerating rate of capital availability. So the problem can be stated easily—an urgent need to maintain conditions under which business and industry can accumulate the capital needs to provide for our expanding economy. Perhaps this problem is more one of recognizing the realities than it is one of taking this action or that. Our wealth is created in industry, it has a big job to do between now and 1975, we must look to industry to keep pace with our expanding needs.

The challenge to business, industry and government is obvious. It is probable that new investments in the order of $60 billion will be needed in the West during the next 10 to 15 years or so for construction purposes alone. Another $50 billion or so may be needed for new plants and equipment. These investments are needed to provide jobs and to keep our economy on the rise in the population and economic explosion now leading us to a new business environment in the West.

I do not suggest that these are all the problems of growth of our economy—far from it. The list is long and is a complicated one even without adding international uncertainties . . . But to quote Mr. Athol McBean, formerly chairman of the board of Gladding, McBean & Co. and one of the nation's leading industrial figures: "The United States is a big country—the future of the country is great—the West is the biggest part of the country—the future of the country lies in the West—think big thoughts about the West."



Koreans are trained here so they can operate steam-electric plants in their own country

Koreans Trained to

Operate Own Power Plants

Anticipating a need for native operators and technicians for three steam-electric power plants now under construction in Korea, Bechtel Corp. this June brought to the United States for training 45 Korean university graduates. After completing a three-phase program sponsored by Bechtel in cooperation with the Foreign Operations Administration of the U. S. government, these men will return to Korea and work in the completed plants.

Their nine-month program of study, observation and inspection suggests one more answer to the always perplexing question "What is the best practical training for power plant operators?"

Aside from the language barrier, the training problem is similar to that often faced by our own operating utilities. Objective is to produce a group of operators and technicians of all grades from turbine operators up to assistant plant superintendent. The plants they are to operate and maintain will have modern 25,000-kw turbine-generators and be designed to burn either coal or fuel oil.

The 45 trainees were selected on the basis of interviews of 160 electrical, mechanical and chemical engineers who had received their university degrees in Korea. They were given an intensive course in English at the Foreign Language Institute of the University of Seoul and were able to read, write and speak English fairly well when they arrived in the United States.

The training program finally adopted includes three phases. First is three

months of concentrated and highly specialized study at the University of California, Berkeley. Second is four months of observation of actual power plant operation in the San Francisco Bay area. Third is a two-month inspection tour of eastern factories. During the entire nine-month period the men will also visit industrial and power installations of many different types.

First Phase

In the first phase of the progam the trainees study English, mathematics, physics, chemistry, thermodynamics, electrical machinery and circuits, and heat power laboratory. Special courses in all of these subjects were set up on the Berkeley campus of the University of California under the guidance of Earl Jones, assistant head of the university's engineering extension. Because of the intensive nature of the presentation of material, the program provides for supervised study time equivalent to the hours of formal classroom instruction.

General nature of the material covered and class hours for each student for three-month period devoted to each subject are as follows: English 110; mathematics 54; physics 36; chemistry 30; thermodynamics 60; heat power and electrical machinery laboratory 65; electrical machinery 60; total 415.

Laboratory work, where the trainees have a chance to familiarize themselves with actual equipment including boilers, turbines and generators, supplements the lectures. In the laboratory emphasis is on application of theory learned in the classroom to actual operation and maintenance of equipment. According to Jones this is one of the most valuable parts of the university training.

Among the reasons for selection of the University of California to administer the first phase of the program were the ability of Engineering Extension to move quickly in setting up a coordinated program, the university's excellent reputation for teaching English as a foreign language and availability of suitable housing. Trainees are quartered at International House, a residence hall for foreign and American students that offers a combination of accessibility to the campus, American living conditions tempered with reasonable concessions to foreign tastes and living accommodations designed for studying.

On-the-Job Training

In the second phase of the program the men will observe full-scale commercial steam-electric power plants in operation. They will be assigned as trainees and observers on an on-the-job training program of four months in Pacific Gas and Electric Co. power plants in San Francisco and Oakland. They will observe and study operating and maintenance procedures and see the practical application of the theoretical material covered in their earlier work.

Factory Visits

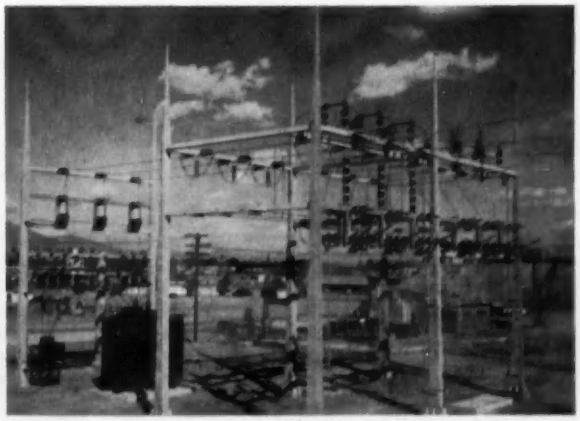
Third phase of the program will take them on a two-month trip visiting factories that manufacture major equipment being installed in the Korean power plants. Included in the itinerary will be General Electric at West Lynn, Mass.; Combustion Engineering, Chattanooga, Tenn.; Raymond Division of Pulverizing Equipment Corp., Chicago; Westinghouse Electric at Pittsburgh and Sharon, Pa.; and Republic Flow Meter, Chicago.

In each plant qualified personnel will explain construction, operation and maintenance of the equipment being supplied for Korean plants. Here the men will also have an opportunity to study differences in blueprint and instruction book standards of the individual manufacturers.

Upon completion of the nine-month program the trainees will return directly to Korea, arriving within a few days of the scheduled date of initial operation of the first plant. Pacific Bechtel Corp., the contractor, will complete the three plants during the spring and summer of 1956. Bechtel technicians will stay on the job for about a year to help "break in" the plants and the operators.

The three plants will add a total of 100,000 kw to Korean power supply. First of the plants to be completed will be a 25,000-kw installation at Tangin-Ri on the west coast near Seoul. Second, with two 25,000-kw units, will be a plant at Masan on the southern tip of the peninsula near Pusan. Third will be another 25,000-kw plant on the east central coast at Samchok.

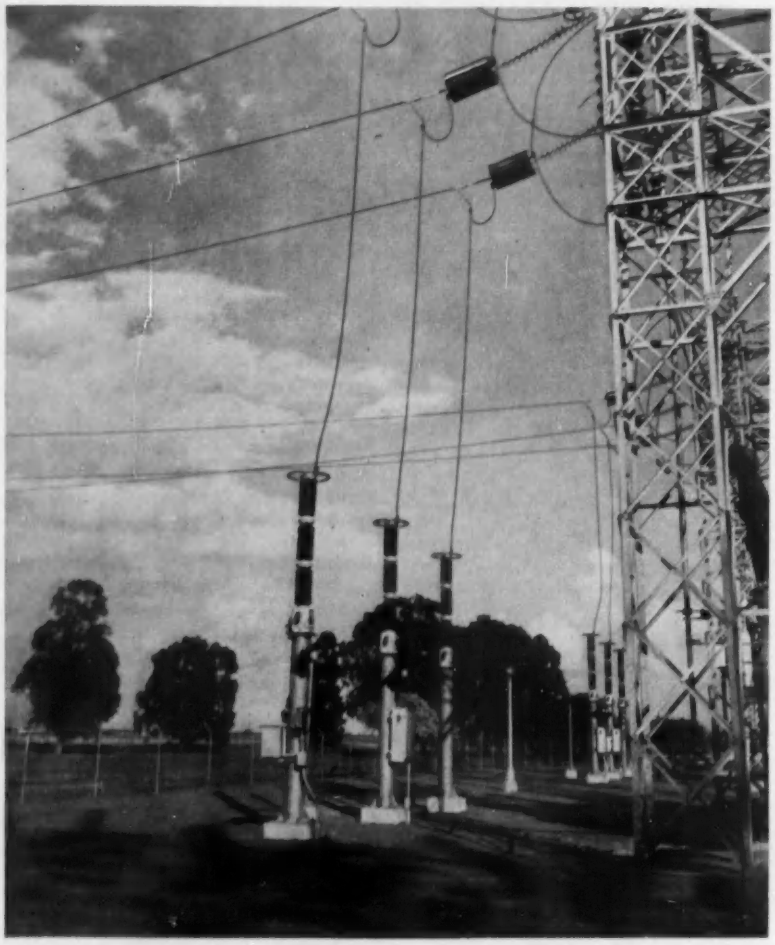
The new installations will almost double the existing power supply of the Republic of Korea. Present output of all electric power plants in the republic is about 107,000 kw, of which 40,000 kw are provided by U. S. government barge plants operating on an emergency basis.



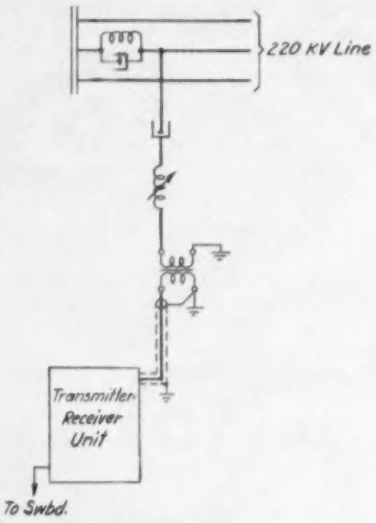
Arizona Public Service Using Box-Type Substation Structure

Following the design of three other substations built within the past two years, a semirigid box steel structure was used for the Jackson Street substation of Public Service Co. of Arizona. Deciding factors were: ease of erection, simplicity, adaptability to additions or changes, pleasing appearance and over-all economy.

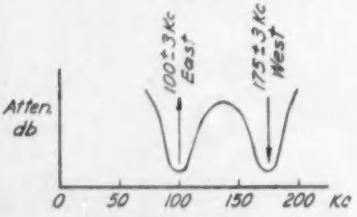
The photographs above show the tapered square steel posts during erection and the completed station.



Regular 400- or 800-amp wave traps and coupling capacitors can be used at each terminal



Present and Future Power Line Carrier Applications
Fig. 1a



Past Methods of Frequency Allocation with Double Tuned Coupling
Fig. 2a

Four-Channel Power Line Carrier

R. L. Brinton

General Superintendent of Communications
Pacific Gas and Electric Co.

A four-channel single sideband suppressed carrier system utilizing a single coupling capacitor and wave trap at each end has recently been placed in operation on the 220-kv lines of Pacific Gas and Electric Co. between Cottonwood and Vaca-Dixon substations. Success of this installation no doubt will have a considerable impact on the power line carrier field. It is not only more economical to install than other power line carrier systems now in use but it also requires less frequency spectrum and uses a low-power output.

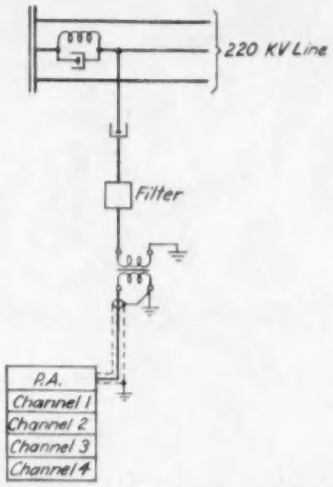
At present most manufacturers of power line carrier equipment follow a standard pattern in carrier design. Transmitters are capable of an output of 10 to 25 w with a receiver of correspondingly low sensitivity. Although either frequency or amplitude modulation may be used, 8 to 10 kc of band width is required in each direction in order to keep crosstalk at a minimum.

Carrier Problems

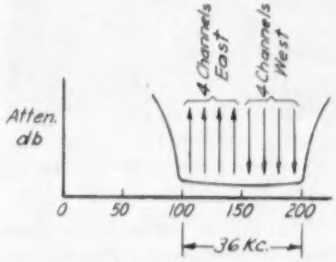
Most power companies with large communication systems find it necessary to use two-frequency duplex (a different frequency in each direction) in order to connect the power line carrier terminals into the PBX switchboards. Automatic simplex systems do not work satisfactorily on other than station-to-station installations. Tying them into noisy wire lines causes them to key automatically unless the automatic transfer unit is set at a point of low sensitivity. In that case a soft voice will have difficulty in keying it.

Carrier engineers in America have for years considered adopting multiple channel telephone carrier equipment to power line applications. It is not entirely new since there are a number of such systems in operation successfully in Europe. Finally an American manufacturer has designed and built a four-channel system.

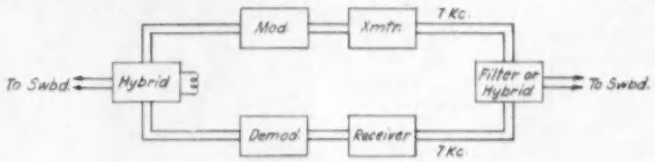
This means that many power companies who need additional telephone



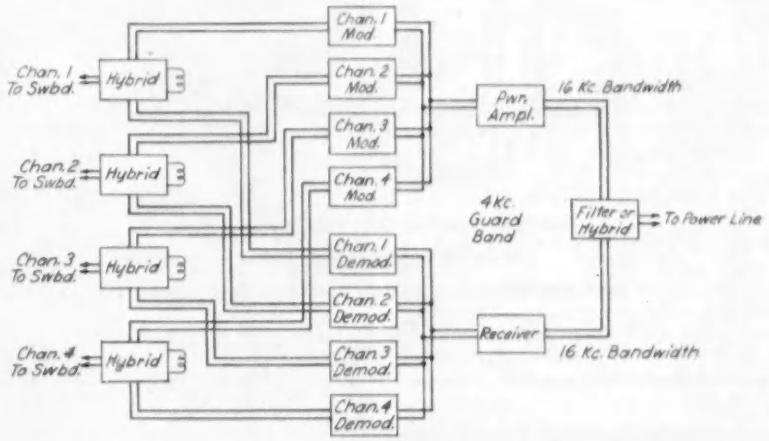
Past and New Method of Coupling Power Line Carrier to Power Lines
Fig. 1b



New Methods of Frequency Allocation with Band Pass Coupling
Fig. 2b



Single AM Channel 2 Frequency Duplex Requiring 15 to 20 Kc. Bandwidth
Fig. 3a



Four Single Side Band Channels Requiring 36 Kc Bandwidth
Fig. 3b

Costs Less, Takes Less Band Width

channels, but are reluctant to go to the expense of installing an extensive microwave system in order to acquire a few additional voice channels, will be especially interested in this installation.

New Carrier System

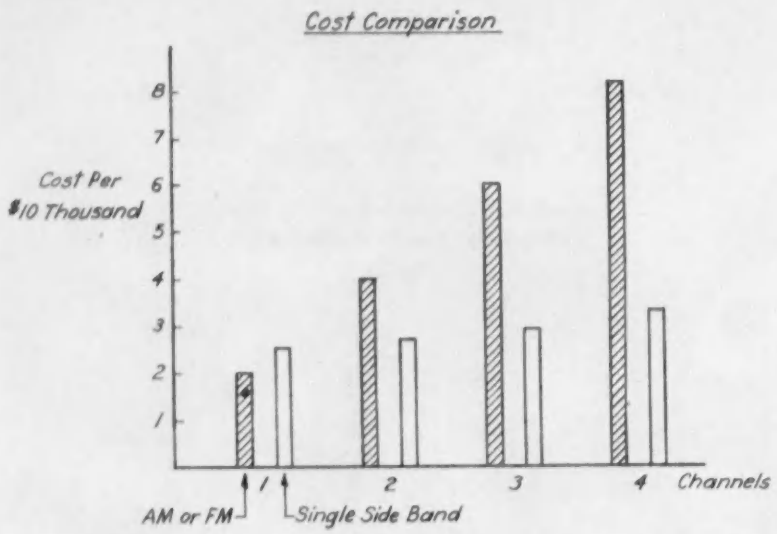
This new system incorporates four channel units similar to "J" carrier type of equipment and the necessary modulators, amplifying equipment and directional filters required for application to a power line (see Fig. 3).

An entire terminal, including power supply equipment, all are mounted on a standard 6-ft, 19-in. relay-type rack. This is normally the same space required for a standard single-channel 10- or 25-w power line carrier cabinet. A band width of 36 kc operating anywhere in the power carrier spectrum of 50 to 200 kc is required for the four channels (Fig. 2).

Four single sideband channels, plus the 3,400/3,600-cycle tones used for signaling and individual channel regulation, require 16 kc in each direction. Between the two 16-kc bands are 4 kc reserved as a guard band. This means that 16 duplex telephone channels can be developed in the 40- to 200-kc carrier band where only eight could be obtained by using FM or AM. As an added feature the manufacturer has included compandors built into each channel terminal, which means that a signal-to-noise ratio of 40 to 50 db can readily be obtained (Bell system toll circuit quality) on each channel.

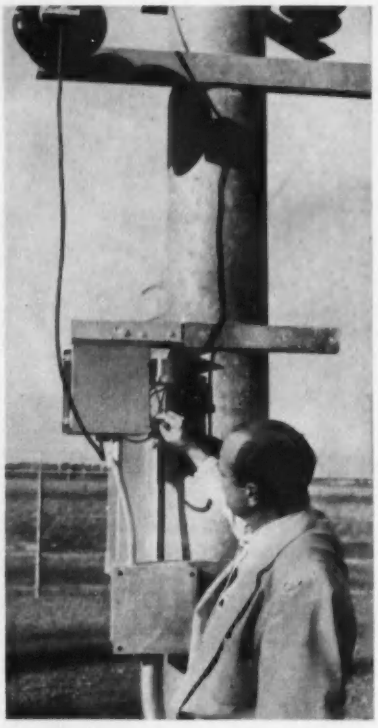
Method of Coupling

Regular 400- or 800-amp wave traps and .001 to .003 coupling capacitors can be used at each terminal (Fig. 1). The carrier can be operated either phase-to-phase or phase-to-ground with equally good results. In order to obtain a sufficient band width for coupling the 36-kc carrier to the transmission line, a filter unit is substituted for the regular tuning unit at the base of the coupling capacitor. This filter unit together with the coupling capacitor and wave trap act as a wide

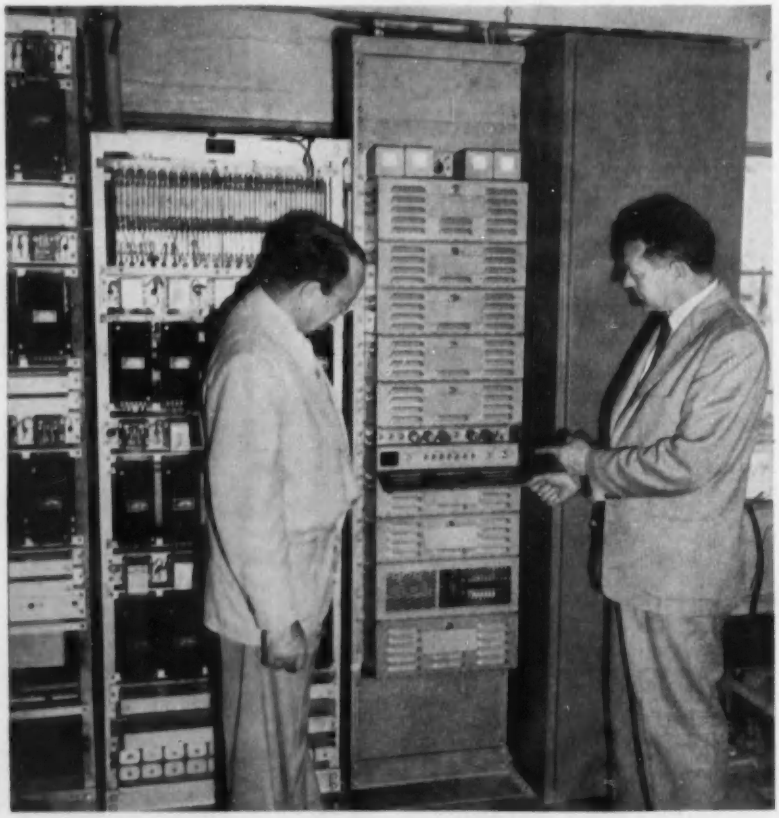


Average Installed Cost Per Channel of AM or FM vs Single Side Band (Includes Wave Traps and Coupling Equipment)

Fig. 4



Filter unit is substituted for regular tuning unit at base of the coupling capacitor



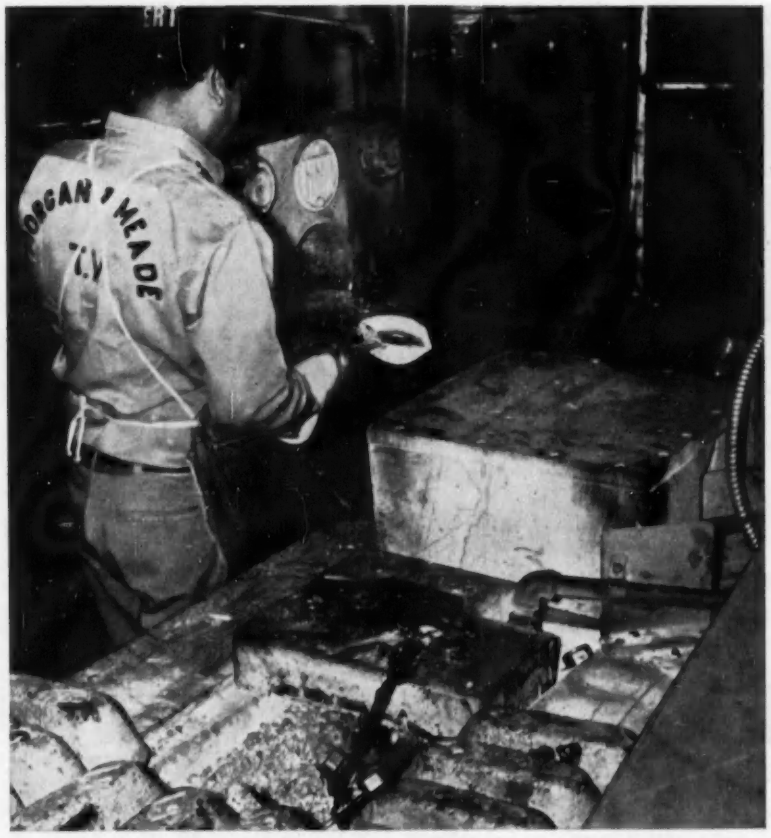
Entire terminal, including power supply equipment, mounts on standard 6 ft x 19 in. rack

band "band pass" filter. This gives greater efficiency than methods employing either the double-tuned unit or an aperiodic coupling device.

Lower Cost

Cost is probably the most important consideration in comparing the two systems. The cost of a single-channel terminal of a four-channel system together with coupling equipment is about 25% greater for comparable single-channel equipment. This is because of the need of having to provide common equipment (modulators, amplifier and power supply) for all four channels even though only one channel is installed. However, additional channels up to four cost less than $2,000 each, as shown in Fig. 4. Thus four telephone channels of power carrier between any two common points cost approximately one-third of what an AM or FM installation will cost. And, as already mentioned, less than one-half the frequency spectrum will be used.

Right now many power companies have utilized nearly all power carrier frequencies and are thus precluded from further expansion of carrier either for relaying or telephone. This new four-channel closely spaced carrier system can now provide immediate relief.



Induction furnace makes possible adding brass to metals that may be used in die casting

Now Brass for Die Castings

Lewis B. Reed

Industrial Heating Consultant
Los Angeles Department of Water & Power

The quality of die castings has increased considerably in the past 15 years. No longer are they scornfully regarded as pot metal junk. Certified zinc has replaced the old pot metal, while aluminum and magnesium alloys are readily used by most die casters. Die castings of these metals are now the backbone of many mass production operations.

Recently another metal, brass, was added to the list readily used for die castings. Brass, even steel, has been die cast in the past but mostly for experimental purposes. Several Los Angeles firms are now making brass die castings with the likelihood that such castings will soon be noticed on the market in considerable quantities. This should cause at least a mild upheaval in the brass plumbing goods industry since a die cast brass part is superior to a sand cast one and has many advantages from the production standpoint.

While die casters argue at length about the advantages of induction furnaces for melting zinc and aluminum, it appears that they find induction melting practically a necessity for brass. Four of the five firms die casting brass in Los Angeles are using induction furnaces, with the fifth one very anxious to make the change. They have found the usual advantages cited for electrical energy, namely, accuracy, convenience, quality, safety, dependability, uniformity, economy and cleanliness. These are real and tangible.

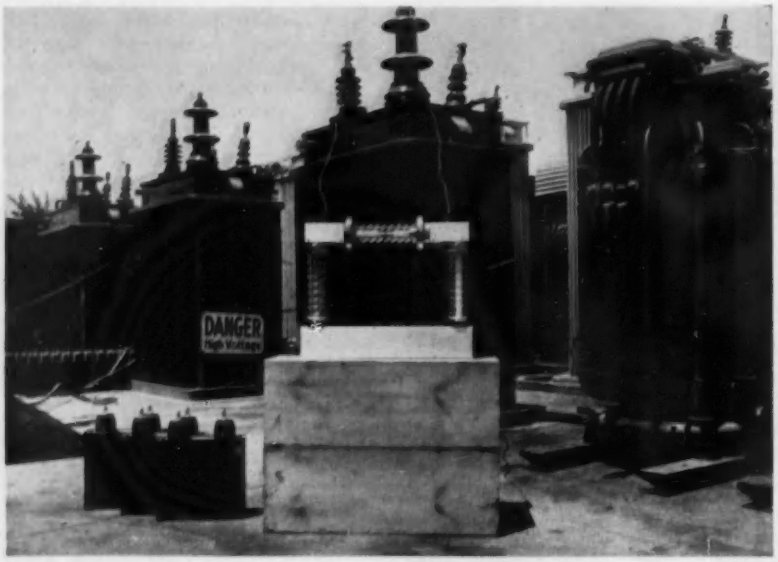
Accurate control of molten metal temperature is very important to die casters. If the metal is too hot it takes a long time to solidify in the die and production drops. If it is not hot enough the metal solidifies before it fills the die and the casting is defective. No fuel-fired furnace can approach the narrow temperature range that is maintained by the induction furnace. Closer regulation means higher production with fewer rejects. Closer temperature control also results in cleaner metal with no contamination from products of combustion or dross caused by overheating the metal.

The die cast machine is essentially a high-production tool, but the operator and not the machine sets the pace. No die cast machine operator can maintain high production while standing beside a sizzling, fuel-fired furnace that is blasting away to keep the brass at a temperature of more than 1,700 F. Operators can maintain high production when using an induction furnace because the heat is produced directly within the brass by induction. The pot of the furnace does not heat the brass; the brass heats the pot and the area surrounding the pot, instead of being a flaming inferno, is filled with insulating materials.

Brass die casters have problems that help an electric utility's load factor. The cost of the die is the biggest expense of any die casting job and much money is lost if the die fails before the expected number of shots are made. This can happen too frequently when die casting brass because the die is heated to temperatures higher than those used for the light metals. Cycles of heating and cooling are hard on a die and shorten its life. The way to prolong the life of a die, therefore, is to keep it hot and working every minute. This means the furnace is also working every minute and the load factor rises in consequence. It might be added that no fuel-fired furnace could begin to stand the pace and run 24 hours a day, month in and out.

Utility engineers should be interested to know that energy is consumed even when the die casting machine is shut down for maintenance or holidays. A molten "heel" of metal must be maintained in the furnace and the controls are usually set on the **hold** position to operate the furnace at full load for at least five minutes out of every hour. This is more economical than removing the molten brass from the furnace and later going through the expensive procedure of preheating the refractory and refilling the molten metal.

Brass die castings will not put the brass foundries out of business, any more than the other die castings have put the light metal foundries out of business. But there are many brass parts that will be formed without the aid of sand molds. And the brass will come from clean, cool, induction furnaces; furnaces with an excellent load factor.



More than 10,000 kva are available for testing developmental models of vacuum switches

Vacuum Switch No Novelty

Several years experience in the manufacturer's own plant, plus years of practical electronic applications, indicate that the vacuum switch is not an unproved new gadget

Utility engineers are showing great interest in power applications of the vacuum switches manufactured by Jennings Radio Mfg. Corp. Recent tests in dropping 115- and 220-kv transmission lines and in switching capacitor banks (EWEST, July, p 72) showed promising results. Two pilot installations are now under way, one for sectionalizing a 138-kv transmission line and the other for switching a bank of 12-kv capacitors.

Because of this great interest and the promise of vacuum switches solving some of the power engineers' switching problems, an editor of ELECTRICAL WEST visited the Jennings plant in San Jose, Calif. It was found that the present version of the vacuum switch is not a sudden new device but one that has undergone many years of development and test. It was interesting to learn that a number of test installations of vacuum power switches have been in service in the Jennings plant for a period of two to six years.

One such installation is shown in an accompanying photograph. This panel is the 12-kv entrance service that has been in constant use for the past two years. The nine vacuum switches shown can be actuated manually or by 6-v d-c solenoids concealed behind the rear panel.

The three switches in the bottom row are mounted as three-phase instantaneous overloads capable of ½-cycle interruption. They are tripped by a low-inductance, series-trip solenoid in the high-voltage lead and are reset either manually or by a 6-v d-c operating mechanism. Before the installation of the 230-v main breakers described below, these 12-kv overloads were required on several occasions to interrupt faults initiated within the plant.

The other six switches are mounted in a three-phase, single-pole, double-throw arrangement as disconnects and automatic grounding switches. For a period of two years, therefore, the 12-kv power lines have been separated from a direct short to ground by contacts spaced only ⅛ in. apart. This is a good example of the high dielectric strengths that can be achieved and maintained in a properly processed vacuum enclosure (100,000 v per one-eighth of an inch). These switches meet AIEE insulation standards and have shown no deterioration with age.

All of the 230-v plant feeders are also switched and given overcurrent protection by vacuum switches with continuous current ratings of 800 amp rms. Loads include electric motors, ovens, conveyor-type furnaces, induction heating and high-voltage processing equipment, and a 50-kw test transmitter. These switches are shown in an accompanying photograph. They are instantaneous trip, manually reset circuit breakers and are also capable of ½-cycle operation.

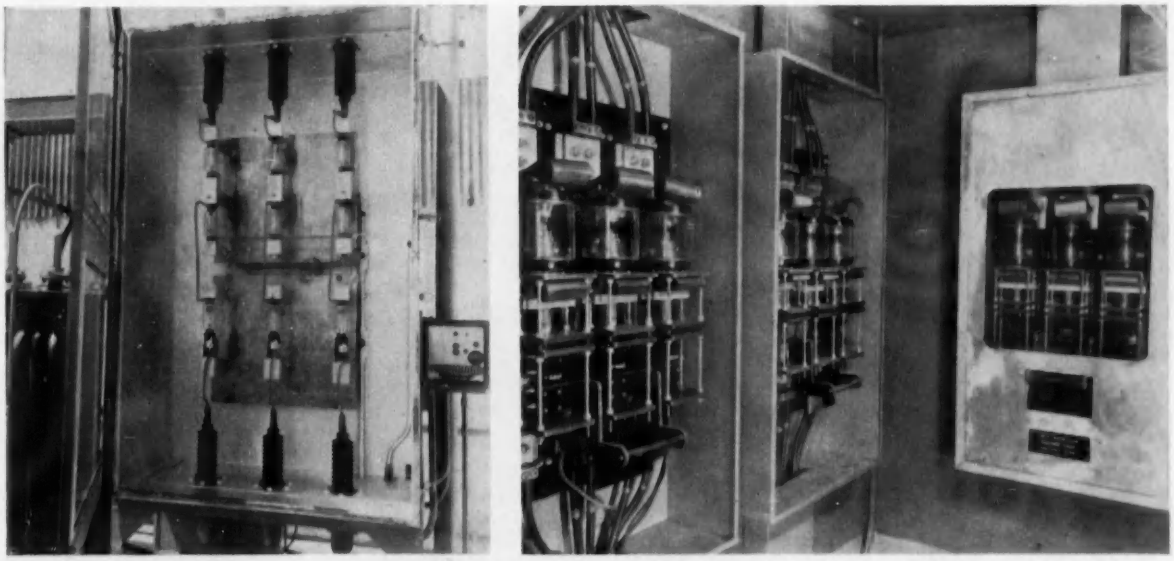
The same type of vacuum switch circuit breaker is used to provide overload protection for the high-voltage test laboratory (shown). In this laboratory 5,000 kva of 60-kv capacitor banks can be switched. Tests are regularly conducted on a 1,200-kva, 7,800-v capacitor bank to meet life requirements of 10,000 operations. Equipment is also available for conducting impulse voltage tests up to 1,000,000 v of standard impulse wave forms, 60-cycle surge current tests up to 100,000 amp at 110 v, and 12-kv current interruption tests up to 7,500 amp. Every fault initiated within this laboratory has been interrupted by these overloads before the 12-kv main vacuum circuit breakers have tripped—and both sets of vacuum switch overloads are set to trip in less than one cycle.

A number of smaller vacuum switches also have been in constant use in the plant for several years breaking 240-v, 60-cycle loads. One of these applications is a resistance furnace drawing 80 amp in which the heating elements are pulsed every 18 seconds with these switches to prevent overshot.

Other applications include a spot welder control with a make current of 100 amp, another furnace control breaking 50 amp and primary overloads on a 50-kw test transmitter. These transmitter overloads with continuous current ratings of 125 amp are set for instantaneous trip at 450 amp and have operated thousands of times. Commercial pilot installations include a 150-hp motor starter and a 12-kv installation for switching a radio station to stand-by power without going off the air.

Radio Background

These power switches with their contacts sealed in a high vacuum are the direct result of the successful development by Jennings of vacuum relays for switching the d-c, 60-cycle and rf currents commonly found in radio transmitters and similar high-powered equipment. The advantage to the transmitter design engineer is that



Vacuum switch applications in Jennings plant. Left: Main 12-kv plant service with three in series and at the right 230-v plant feeders

for the first time he has a fast operating overload device that can be placed either in the high-voltage d-c circuits or in the high-voltage leads to the rectifiers.

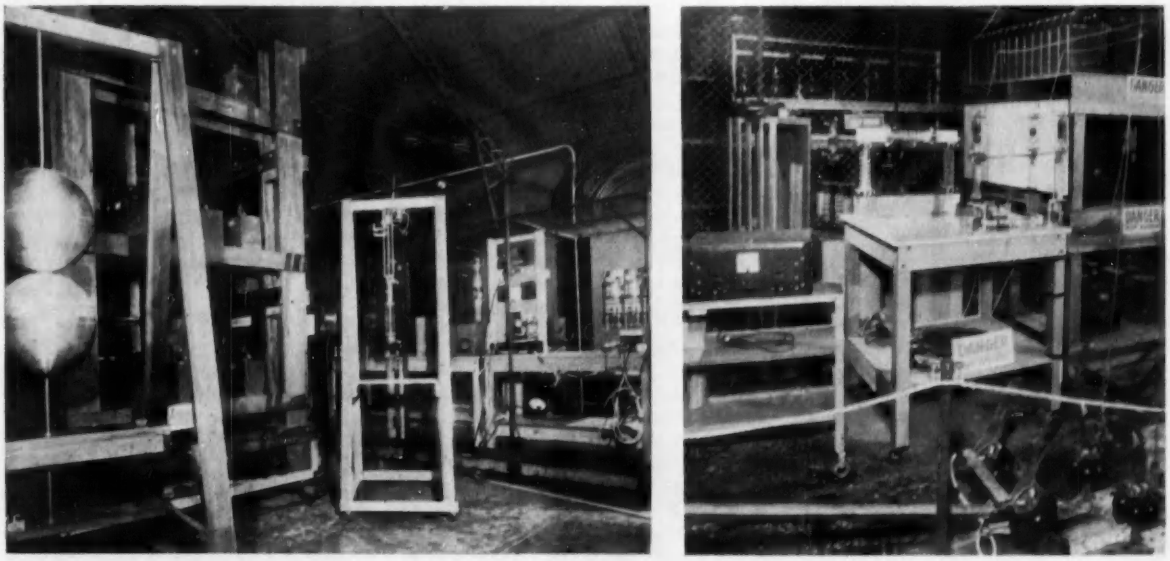
In the manufacturer's plant small vacuum relays are used for individual protection of mercury vapor rectifier tubes against overload or inversion, handling 12 kv at 2- to 20-amp d-c. Single-pole, double-throw models are installed on vacuum furnaces as combination d-c overloads and automatic grounding switches that trip each time gas ionization occurs. They are also used extensively in the high-voltage d-c circuits of test transmitters.

Many manufacturers are now using and have been using for a number of years these vacuum switches as a component switch in their heavy electronic equipment. These include such companies as General Electric, Westinghouse, RCA and others. They are also used and have been used for a number of years in military equipment.

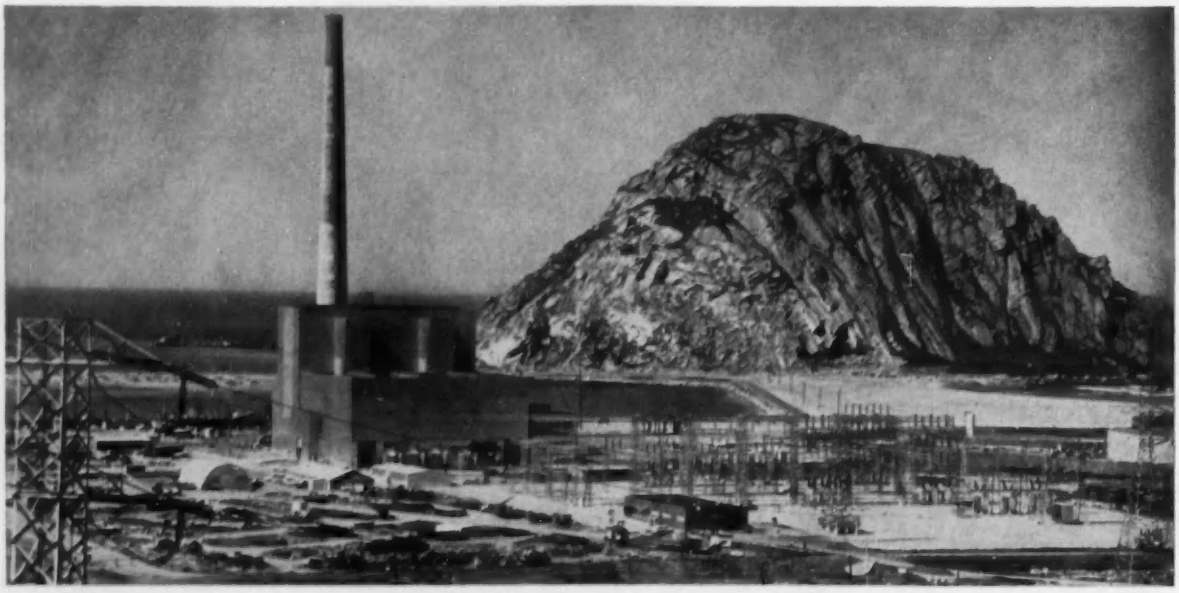
Transmitter Use

In ground station transmitters they are operating carrying rf loads of 100 amp from 40 to 85 kv. They have also been operating as antenna transmission line switches in transmitters with up to 250 kw of power and are frequently used for charging and discharging high-voltage capacitors. Some of these applications require the breaking of high power d-c, some are at 60 cycle and some at radio frequencies.

In going through the plant it was interesting to find that of the many types of vacuum switches being made one type, the R-8, applicable to capacitor switching and transmission line dropping, is on a production-line basis. This switch is the type used in the Schwager-Wood Bonneville tests reported in the article in the July issue referred to above. It is suitable for assembly with or without air break disconnects for capacitor switching in the 12- and 4-kv class. With the proper number of units in series for the particular transmission voltage involved, the R-8 switch is being applied to high-voltage line dropping as well.



Million-volt impulse generator (left) at Jennings high voltage lab. Right: Three 400-kva capacitor banks for testing vacuum switches



Architecturally pleasing Morro Bay steam plant is first in the nation to derive boiler feedwater by converting sea water to fresh water

Sea-Water Evaporators for Morro Bay

Conversion of sea water to fresh water, fluted aluminum architectural finish, 450-ft stack and submarine oil pipe line are features of latest PG and E steam plant

A. W. Bruce

Senior Mechanical Engineer
Pacific Gas and Electric Co.

A landmark on the Pacific Coast is the Morro Bay steam-electric plant of Pacific Gas and Electric Co. with its modern fluted aluminum architectural finish, its system for converting sea water to fresh water, its illuminated 450-ft concrete stack and its submarine pipe line for delivery of fuel oil from ocean-going tankers.

Initial installation of the plant will have two turbine-generators with a total gross normal operating capacity of 300,000 kw. Estimated cost is $44,000,000. The first unit was dedicated on July 8 of this year at a ceremony attended by citizens of the area and officials of PG and E and Bechtel Corp., constructor of the plant. The second unit is scheduled to go into service in 1956. Morro Bay steam plant is the sixth major steam plant placed in operation by the company after World War II and is the fourth largest generating plant on the PG and E system.

Location and Site Selection

The plant is situated on Morro Bay and state route No. 1 approximately halfway between San Francisco and Los Angeles. The 140-acre site is sufficient to accommodate an ultimate eight units. This location was selected because at the present time a substantial block of power could be used in the San Luis Obispo-Santa Maria area. It was the best available site on the ocean west of the southern end of the San Joaquin Valley in which a major part of the plant's output will be used.

Architectural Features

Because of the location in the Morro Rock scenic area emphasis has been placed on the architectural treatment of the building as shown. The walls of the turbine room and boiler have been made of fluted aluminum siding with the offices, machine shop and warehouse faced with harmonizing shades of grey porcelain-enameled steel paneling. The upper portion of the walls of the screen house is covered with fluted aluminum siding and the lower part is protected with a dark green precast concrete paneling.

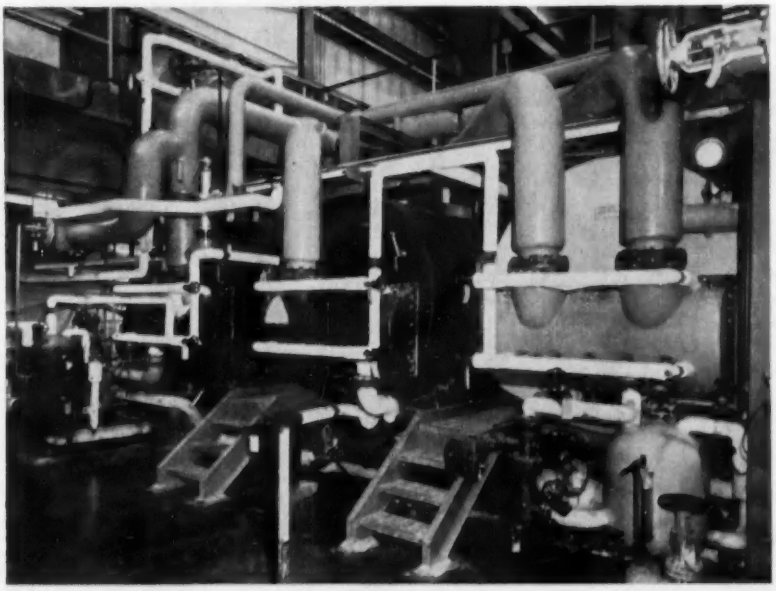
Plant Arrangement

The two tandem compound turbine-generators are set side by side, 90 ft center to center, with axes at right angles to the length of the turbine room. Boiler and turbine are on common center lines. The main transformers are located outside the turbine room at the generator end, offices are located at the unit No. 1 end of the plant with the machine shop adjacent and opening into the turbine room, the warehouse is adjacent to the boiler on the opposite side of the office.

Design Conditions

Throttle steam conditions are 1,800 psig with initial temperature of 1,000 F and reheat temperature of 1,000 F. Condenser design conditions are 1½ in. Hg absolute pressure with 70 F cooling water. With 55 F cooling water, condenser performance has been better than 1 in. Hg at maximum load. Best expected net heat rate is about 9,530 Btu per kwh.

Steam is supplied by one Combustion Engineering 1,135,000 lb per hour



This is nation's first large-scale industrial installation of sea-water evaporators on land

radiant-type boiler for each unit. Fifteen Peabody 10 to 1 ratio, wide range, constant differential oil burners are arranged for front firing. Initial firing was with oil having a viscosity of 600 SSF at 122 F. Two forced-draft fans, two induced-draft fans and two Ljungstrom-type air heaters are used. Steam temperature control is by one gas recirculating fan together with spray attemperation. Remote supervision of burner conditions is provided by two closed circuit television cameras which together with drum level observation are transmitted to the central control room. Start-up firing is provided by three air atomizing oil burners using diesel oil. Gas-electric burner igniters are supplied from a 5,000-gal propane tank.

Stack

One 450-ft-high, tapered, reinforced concrete stack for the two boilers is located at the rear of the boilers. Outside diameter is 42 ft, 8 in. at the base and 17 ft, 6 in. at the top. At full load, the exit gas velocity is approximately 100 ft per second. As a warning to aircraft, the stack is illuminated at night with incandescent lighting.

Fuel System

Fuel is delivered to the plant from an off-shore submarine fuel oil line. A 24-in. pipe was selected so fuel oil having a viscosity of 1,500 SSF at 122 F could be pumped if it was decided later to use this heavy oil. In operation, a tanker is anchored in 55 ft of water 4,000 ft from shore and picks up the end of a 200-ft long, 12-in. inside diameter neoprene rubber hose. After connecting its piping to the hose, the tanker pumps the oil to one of four 195-ft diameter by 32-ft tanks, each with a capacity of 168,000 bbl. When oil heavier than 200 SSF is pumped the initial oil and the last 3,500 bbl of oil are of this viscosity, to insure that the line can be cleared later. As the tanks will store heavy fuel oil, the sides and roof have been insulated with 2 in. of rock wool protected by asbestos-cement sheets.

Turbine-Generators

The General Electric turbine has a guaranteed capability of 156,250 kw at 1.5 in. Hg absolute exhaust pressure. The main generator is rated at 183,824 kva at 0.92 power factor with 30 psig hydrogen pressure, three phase, 18,000 v. The turbine is 3,600 rpm, 21 stage, tandem compound triple flow. Excitation is provided normally by a gear connected shaft exciter, 1,191 rpm, 375 kw, 375 v. One spare station exciter is provided for both units.

Cooling Water Supply

Cooling water is borrowed from Morro Bay and returned to Esterro Bay on the northerly side of Morro Rock to insure that there is no recirculation of the warmed sea water. Located at the edge of the bay is the attractive screen house that houses four Chain Belt traveling water screens and four Westinghouse vertical mixed-flow circulating water pumps, each having a capacity of 49,300 gal per minute at 25-ft total differential head. Two pumps serve each condenser through two 54-in. reinforced concrete pipes. The Westinghouse condenser is single pass, radial flow type with 65,000 sq ft surface of 7/8 in. outside diameter, No. 18 Birmingham wire gage wall thickness, aluminum brass tubes. Each condenser discharges through one 5x7-ft concrete tunnel into a common 7x10-ft concrete tunnel and thence to the bay.

The screen house also houses two Wintroath 1,400 gpm, 87 total differential head, vertical auxiliary cooling water pumps that pump sea water first through the auxiliary cooling water heat exchangers and thence to the sea-water evaporators.

Growth of mussels in the circulating water system will be controlled by recirculating the warmed sea water between the condensers and the intake structure for short periods of time and allowing the water temperature to increase to 100-110 F.

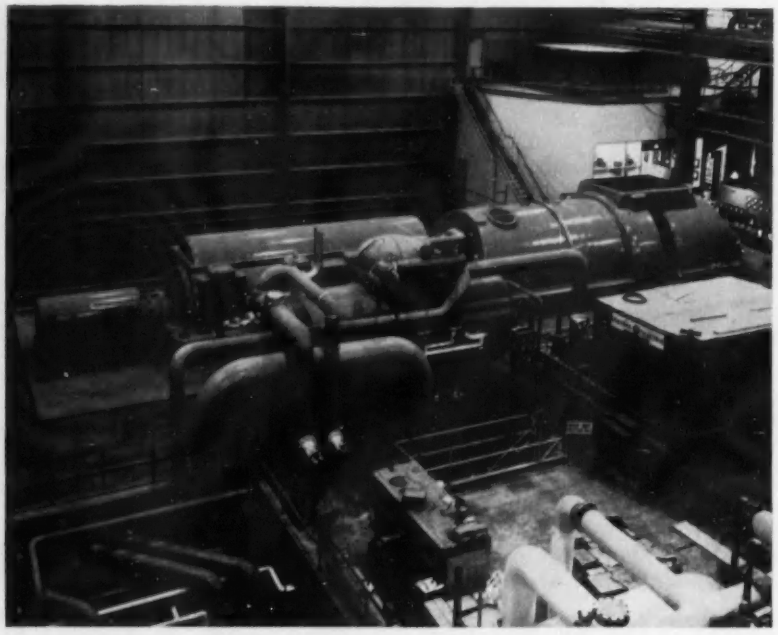
Condensate and Feedwater System

From the condenser hotwell, the deaerated condensate is picked up by one of the two full-size Westinghouse vertical, pit-type, 2,400 gpm, 825 tdh condensate pumps and pumped in turn through the air ejector; Alco heater No. 7 drain cooler; Westinghouse heaters 7, 6 and 5 located in the neck of the condenser; Lummus horizontal closed-type heaters 4 and 3 to the suction of the boiler feed pumps. For the two units there are five Worthington 9-stage barrel-type boiler feed pumps, two for each unit plus a common spare. These pumps have a capacity of 3,500 gpm at 5,800-ft tdh and are direct driven by a Westinghouse 2,250-hp, 2,300-v dripproof motor. The boiler feedwater is then pumped in turn through two Bailey feedwater regulating valves in series; Lummus vertical U-tube high pressure heaters Nos. 2 and 1 to the boiler's economizer. This is the first PG and E steam plant using a completely closed feedwater heater cycle. All deaeration will be accomplished in the main condenser.

Sea-Water Evaporators

The make-up water required for the boiler as well as the station fresh water requirements are provided by sea-water evaporators. After study of the sources of fresh water available, it was decided that the system that would give a reliable output at the least annual cost was sea-water evaporators. One Lummus three-effect sea-water evaporator is provided for each unit. It is designed to produce 50 gpm with a purity of at least 50 parts per million. This water is generated by steam from the "high purity" station evaporator, which in turn obtains its heating steam

from the main turbine's fourth extraction stage. A part of the 50-ppm water is fed to the 30,000-lb/hr station evaporator to be redistilled to give a purity of better than one part per million. (A detailed description of the sea-water evaporators has been published in the December 1954 issue of *Combustion* magazine.)

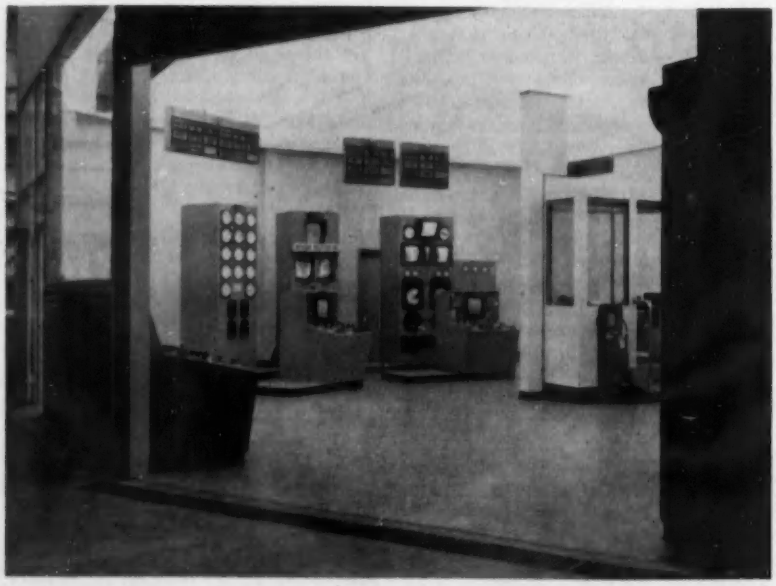


Steam conditions for 156,250-kw unit No. 2 are 1,800 psig, 1,000 F and reheat of 1,000 F

Electrical System

The main generator is connected by 18-kv, 6,000-amp, isolated-phase bus to three single-phase General Electric transformers having a bank rating of 120,000/160,000/200,000 kva, OA/FA/FA. One spare transformer is provided for both units. Voltage is stepped up to 220,000 v and connected to the transmission system through a 220,000-v bus structure. This is 400 ft long by 225 ft wide, containing six 1,200-amp, 220-kv oil circuit breakers (four Kelman and two Westinghouse), having an interrupting capacity of 5,000,000 kva. Power is transmitted at 220 kv to Gates substation near Coalinga in the San Joaquin Valley. One 220-kv circuit is provided for the first unit, and a second will be installed for the second unit. Power is also supplied to San Luis Obispo substation by one 110-kv line connected to the 220-kv bus structure through an interchange transformer bank consisting of three Westinghouse single-phase autotransformers having a bank rating of 84,000/112,000/140,000 kva, OA/FA/FA, and a three-phase Westinghouse regulating transformer rated 105,000/140,000 kva, OA/FA. The switchyard is now controlled from a temporary panel in the power plant control room but will be controlled from the switchyard control building in the near future.

Normal source of auxiliary power is provided at 2,400 v from three-phase house transformers, rated 10,000 kva, OA, which are connected to the generator isolated-phase bus. Power for start-up and emergency operation is provided by a connection to the 2,400-v tertiary winding on the interchange transformer bank. This tertiary winding also provides excitation for the 110-kv regulating transformer. Automatic transfer of the 2,400-v auxiliary bus to the interchange bank is provided for in case of failure of the normal source. Motors 400 hp and larger operate on 2,400 v. All other integral hp a-c motors operate on 480 v supplied from various load centers. Control of the 480-v motors is provided as follows: 50 hp and below—combination starters; 60 hp to 250 hp—low-voltage switchgear.



Luminous ceiling control room has three television screens that show boiler conditions

Centralized Control

The control room is located between unit No. 2 and future unit No. 3 so that four units can be operated from it. The arrangement is very similar to that of the Pittsburg plant control room. Control boards for all major equipment are arranged in a hollow square configuration around the operators' telephone booth. From this desk the operator faces the master control and generator control boards, which together with associated vertical boards form one full side and parts of the two adjacent sides of the square. The opposite side is occupied by the feedwater control benchboard. Station service, excitation control and 125-v d-c control benchboards are on the side partly occupied by the generator boards. A large fire door, which is normally open, provides access to the firing aisle.

Pacific Gas and Electric Co. engineers carried out the studies and made the site selection, prepared the basic plant arrangement and selected the major equipment. Bechtel Corp. was retained as engineer and constructor under the general direction of the utility's engineers.

ELECTRICAL WEST Contractors' News Letter

QUICK NEWS ON TRENDS, LAWS, CODES, MATERIALS, EQUIPMENT, COSTS, WAGES, ETC.

Untimely

In J. Scott Milne's unexpected death by heart attack July 20 at his Portland farm, the International Brotherhood of Electrical Workers and the electrical industry lost a remarkable union leader, one the brotherhood will not easily or fully replace. From tough lineman to a dedicated evangelist is a transformation not often found in labor circles. In his eloquent speeches and as editor of IBEW's "Journal" Milne brought religious fervor and poetry into his expression. Often at banquets and social gatherings, his rich singing voice inspired warmth and friendship. Yet in negotiations he was a hard but fair bargainer for his union.

Served in the West

A Westerner, Milne was born in Vancouver, B. C., started in the industry in 1918 as lineman apprentice for Portland General Electric Co. and was initiated in Local Union 125. He considered the Oregon region his home. After serving as secretary of the Portland union, he became international representative, then vice-president for District 9 with headquarters in San Francisco, where he served for 16 years from 1931 to 1947. When Dan Tracy was restored to the presidency at the San Francisco convention in 1947, Milne was elected international secretary. He succeeded Tracy when the latter resigned in April 1954 and was unanimously elected at the convention in Chicago later. Oddly enough, Tracy died early this year.

Successor

To succeed Milne, Gordon M. Freeman, vice-president of District 4, Cincinnati, was selected by the executive council. He will serve until the next convention and election. District 4 comprises the states of Kentucky, Maryland, Ohio, Virginia and District of Columbia. Freeman, a member since 1913, was elevated to staff position in 1930 and has been district vice-president since 1944.

What now?

Since a change in leadership often brings changes in policy contractors, who have no vote regarding this very important phase of their activity, are awaiting with understandable interest the establishment of the new regime.

Second bounce

Conduit price increases of about 7½% were announced by the manufacturers following the steel wage settlement. New Western prices may not reflect the full 7½% because of lighter weights and hence less freight. Wire prices are expected to reflect the settlement of the copper mine strike. Already three switchboard manufacturers have announced increases in panelboards. There is a slight inching up of prices noticeable in many lines during July. All this despite CIO protestations that the new scales should not increase prices because profits are favorable.

See saw

Wage increase of 15c an hour for journeymen was given the local union 302 by the Contra Costa electrical contractors. It will be effective Jan. 1 and is designed to bring the Contra Costa scale even with San Francisco and the peninsula, which goes up another 7½c at that time. This will leave Oakland 10c lower than its surrounding bay area.

Another step

The U. S. Senate passed S. B. 1644, the federal construction contract act, late in the last month. Final acceptance may still depend on House action, before going to the President for signature.

NEB changes

That the National Employees Benefit Agreement be changed in 17 instances is recommended to the board of governors of the National Electrical Contractors Assn. at the October convention in New York City, by action of the NECA's executive committee meeting at French Lick, Ind., June 20-21. Also approved was a credit insurance plan on a voluntary basis and easing of the requirements for membership of line constructors.

Credit check

Tightening of credit for FHA and VA loans, announced the last of July, is being watched for its potential effect on house building. Length of terms was reduced to 25 years from 30 and a 2% minimum down payment required for the first $9,000 of the loan. Whether appreciated or not, it is better for the building business and the economy that way.

Uniform

Honolulu is studying the possibility of adopting the uniform building code of the Pacific Coast Building Officials Conference, which includes the National Electrical Code.

Stops retailing

A commendable sales policy has just been announced by Rome Cable Corp. in regard to its rigid conduit sales. On and after July 1, it announced that all orders would carry price differentials to take care of the added cost for making smaller direct shipments, either direct to the job or to the contractor. "We are conscious of the fact that in making these smaller direct shipments for the jobber the manufacturer is assuming the important functions of stocking and shipping which are properly the responsibilities of the distributor," G. E. Rolston, vice-president and director of sales, said. What it amounts to is that a distributor purchases a half carload, something that should be within the range of operations of any distributor.

Busy times

Construction activity throughout the West seems to be at a high level, from all reports. In fact, there seems to be a shortage of manpower in many areas. This is accentuated by the vacation plan in effect during what is the best construction season. Most of the consulting electrical engineers are busy with more plans for work soon to be put to bid. Housing continues at a fast pace and a slight increase in the number of 100-amp services is reported by one utility. Competition continues very sharp although the number of bidders on school and similar jobs seems to be lessening.

Noise vs heat

Whether air conditioning equipment can be installed in side yards between homes is an issue before the Phoenix, Ariz., city council. Amendment to the zoning ordinances to permit such installations, if set back two feet from the property line, was introduced but drew a flood of protests because of the noise near bedrooms. Where some customers are sensitive even to an electric meter, an air conditioner could really become controversial.

Remodeling opportunity

Two more companies announced baseboard electric heaters. Westinghouse now has baseboard sections that maintain an outer surface temperature of approximately 100 F, installed in two-foot sections, using as many units as calculations require. A control panel is coupled into the heating system for each room to conserve heat . . . Cavalier Corp. of Chattanooga also announced a baseboard heater whose temperature stays below 125 F. A feature is use of aluminized steel reflectors as baffles to distribute the warm air. It comes in 32- and 48-in. lengths at 160 w per foot.

Like beer cans now

General Cable Corp. has told its wholesalers that cable reels will be expendable except for the very large sizes. This solves a difficult return problem and considerable bookkeeping.

Timely topic

Wiring will come in for considerable discussion at both the residential and the commercial-industrial group meetings during the Business Development Section, PCEA, annual conference at Huntington-Sheraton Hotel, Pasadena, Nov. 3-4. Jack Kiedaisch, section chairman, announced meetings of the residential adequate wiring committee under H. L. Moore, Southern California Edison Co., and commercial-industrial group meetings for wiring and lighting under Douglas S. Aiken, PG and E, Oakland.

Voluntary 100-amp

Acme Electric of Denver has completed the first of a large group of houses bearing the AW seal of approval with 100-amp service equipment. Homes will have approximately 100 outlets on 12 circuits. Herman Band, Acme Electric, member of Rocky Mountain Chapter, NECA, was aided in selling Fred Keller, building contractor, by John Garvin and Al Toppin of the dealers and builders department of Public Service Co. of Colorado and Meryl Mentzer of RMEL inspected and certified the jobs.

Rewiring promotion

A home modernization sales program is being developed by Public Service Co. of Colorado, dealers and building department, under John Garvin and Harold Risley. For a similar program in Cheyenne, Casper and Laramie, the Rocky Mountain Electric League and NECA are working together with the power companies serving those areas.

Considers

Fresno, Calif., is working on a new code and it is almost certain to adopt 100-amp service entrance requirements as minimum.

Both displayed

Display boards of 100- and 200-amp main service entrance panels will be featured at the Red Seal planning service exhibit at the Pacific National Exhibition in Vancouver, Aug. 24-Sept. 5. The Electrical Service League of B. C. will sponsor the booth.

North branch

Valley Electric Supply Co. of Sacramento has established a Redding branch at 1117 Parkview St., Redding, with Emory Ericksen, former electrical contractor who had retired, as resident manager.

Service

California Electric Co., Oakland, has been appointed authorized service station for Budget Hoists for the northern California area.

Preview officers

Arizona Section, Illuminating Engineering Society, introduced its officers-elect for the forthcoming year at its last meeting before vacation. Bevin Jones is chairman, John Gohring, vice-chairman, and Dick Williams, secretary-treasurer. Jerry Whitnell of Arizona Public Service Co. has been elected regional vice-president for the Intermountain Region.

Selected

Southern Colorado Chapter, IES, Pueblo, elected William A. Proudfoot as chairman and Robert F. Even, secretary-treasurer. The board of managers has on it Carl F. Balsick, Charles D. Bell, E. H. Pemberton, Clarence F. Hoer.

Show time

Exposition of Modern Living at the Oakland Auditorium and Exposition Building, Oct. 1-9, sponsored by the Northern California Electrical Bureau, will have a section devoted to wiring and lighting promotion. The center of the area will feature the PG and E adequate wiring displays and will be flanked by contractors' exhibits of lighting, fixtures, built-in devices and wiring materials.

Newest bureau

Roswell, N. M., is the latest to obtain a license to operate under the National Adequate Wiring standards. The Chaves County Adequate Wiring Bureau has been set up jointly by the West Texas-New Mexico Chapter, Roswell division of NECA and the Roswell electrical appliance dealers. John D. Blea, Blea Electric Co., a contractor, is chairman; Roy L. Flood, Southwestern Public Service Co., Tom Stapp of Bill Dean's Appliance Co. and Richard L. Bock are other officers of the bureau.

Tells 'em

"Bright ideas for the ladies" is the approach the armored cable section of NEMA makes to the adequate wiring program in a spritely little booklet prepared for distribution to women. It is designed to show them "what to teach husbands about electric wiring."

Light news

News in light and lighting—Sylvania has announced three new lighting fixtures, the Scott, with all-luminous plastic shielding, capable of color effects with green or coral tints as well as white; a chalkboard light, designed to illuminate school chalkboards; and a new industrial series, of semidirect, slotted for ventilation and upward light . . . Day-Brite Lighting Inc. announces that it has added "pig tails" to the sockets for its incandescent fixtures as an aid to the installing wireman . . . To satisfy architects wanting elegance in lighting fixtures, Lightolier announces "Jubilee" in glass and gold that has a contemporary look. Another new fixture is the "Duocone," an incandescent fixture throwing light upward and downward from two cones . . . General Electric Lamp Division has a new bulletin showing the several types of mercury lamps and giving full data as to their characteristics and applications . . . Craft Lite, a vapor-type fixture made by Paramount Industries Inc. of Flint, Mich., has announced a full line of 1-, 2-, 3- and 4-lamp models and service station island luminaires. Designed for use in moist locations, the vapor- and dust-tight construction appeals for a great many other applications . . . Bakelite Co. has a brochure showing the types of luminous ceiling material made from rigid vinyl sheets and the various applications.

Cooling switches

Air conditioning switching brought forth these new items—M. H. Rhodes Inc., maker of timing switches, has a Mark-Time switch for use in controlling the timing of attic fans, window air conditioners and any electric cooling device, available in three timing ranges. Capacity 20 amp, 125 v . . . Arrow-Hart & Hegeman Electric has some switch controls for air conditioning, featuring maintained contact, with the neutral in the off position in the center, available with a variety of plates.

Hurry back!

Harold H. Robinson, although officially supervisor of domestic sales, East Bay division, PG and E, was best known for his lighting work with that utility and the training of a large number of the company's lighting staff. He retires Oct. 1 after 32½ years with PG and E. He is past chairman of the Northern California Section, IES, and previous to that was secretary. After some extended travels, he may set up as a consulting engineer, he said, in the Bay area.

Now the selling

Certified Lighting programs in the San Francisco and San Diego Bay areas have closed the first part of their activity, namely, the technical and selling classes. The Northern California Electrical Bureau had a total enrollment of 130, 108 of which were electrical contractors. Classes were held Mondays in Oakland, Tuesday, San Jose, Wednesday in San Francisco and Thursday in San Mateo. The last of the classes was finished early in July. Committee meetings on the next phase, that of promotion and selling, will be held under Chairman Frank Falge . . . In San Diego 28 certificates of completion were presented by Ralph Phillips, vice-president, San Diego Gas & Electric Co., at the San Diego Bureau of Home Appliances, Contractors' Division, dinner June 27 at La Mesa. Speakers were A. H. Gudie, Biddle Trade Bureau, Los Angeles, and Walter Chapman, San Diego Gas & Electric sales manager. Fred Byrom, Ets-Hokin & Galvan Co., is chairman of the Contractors' Division, and Carleton Bunce coordinator.

Big and new

Interested in electronics? The Western Electronic show and convention will start Aug. 24 at the Civic Auditorium, San Francisco, and run through the 26th . . . Also Stanford Research Institute will hold a symposium on electronics and automatic production at the Sheraton-Palace Aug. 22-23.

Held inland

Electrical Contractors Association of British Columbia held its fourth annual conference July 29-30 at Vernon, B. C. Panel discussions were to be held on the Canadian code, adequate wiring, new products.

Promoted

Willard C. Hird has been named assistant manager for the Pacific Coast for Westinghouse Lamp Division, which now makes headquarters at Emeryville. He joined the company in Spokane in 1948.

Expands

North State Electric Supply Co. moved to larger quarters at 1264 Folsom St., San Francisco, a few doors down from its former location. Owned by John Salonen and Sil Chaippari, former G-E Supply men, the move was something of an anniversary of a year in business. With 9,500 sq ft instead of 3,300 and its office on the mezzanine, better facilities for drive-in service, the new supply company will be better able to serve the Bay-area counties, its owners feel.

New services

Pacific Electric Motor Co. in a new brochure announces the addition to its complete industrial electric service facilities in the motor winding and repairing field and construction, a new transformer department and a switchboard department. Located at 1009 66th Ave., Oakland, it has also done some interesting work in building equipment for nuclear physics.

Big jobs

Cascade Constructors, a joint venture of Wismer & Becker, Sacramento, Morgan Electric Co., Seattle, and P.S. Lord Mechanical Contractors of Portland, has issued a handsome brochure describing its integrated engineering construction service, illustrated by a number of projects on which the individual companies in the group have worked. Among the big projects listed are McNary Dam, Albeni Falls Dam, Metropolitan Water District, Box Canyon Dam, Hungry Horse Dam, Grand Coulee Dam, Rock Creek power house, Davis power plant, Keswick Dam, etc.

New regime

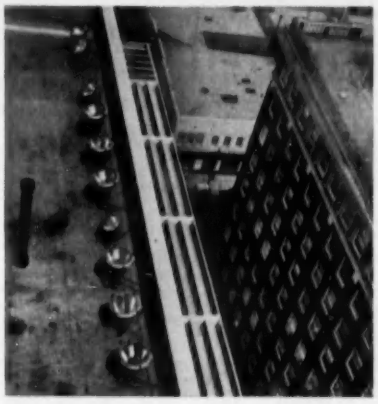
Henry M. Conover was elected business manager of Local 77, IBEW, Seattle, succeeding Lloyd C. Smith, the line local governing Washington and northern Idaho.

GAW in Seattle

Under an annual wage agreement signed last year between Local 46, IBEW, Seattle, and the Oil Burner Dealers' Assn., a raise of $4 a week to $105 per week was agreed to as of July 1. The guarantee of full employment for regular workers necessitated some leveling out of peaks and valleys in this maintenance type of work.

Stimulate action

San Joaquin County Chapter of NECA recently staged a big adequate wiring promotion dinner, attended by 175 electrical and building contractors, real estate and bank representatives in cooperation with Pacific Gas and Electric Co. Clair Wilbur, Stockton manager, PG and E, was host. Speakers were John S. C. Ross, manager, residential sales, who also showed the "Magic Link" film, and Frank Mayo, Stockton architect. Eugene McCarthy, NECA chapter president, spoke on contractor and dealer cooperation and W. J. Varley, manager, San Francisco Electrical Contractors Assn., pointed out the business possibilities for the industry if all would quit selling "a Model T job to customers who want Rolls Royce."



Denver Club occupies top floors, has controlled light beamed from ornamental units; tower with elevator and substation penthouse is floodlighted by units like those shown, top right, and Crouse-Hinds units mounted on rim of tower setbacks (bottom)

Denver Club Goes High and Modern

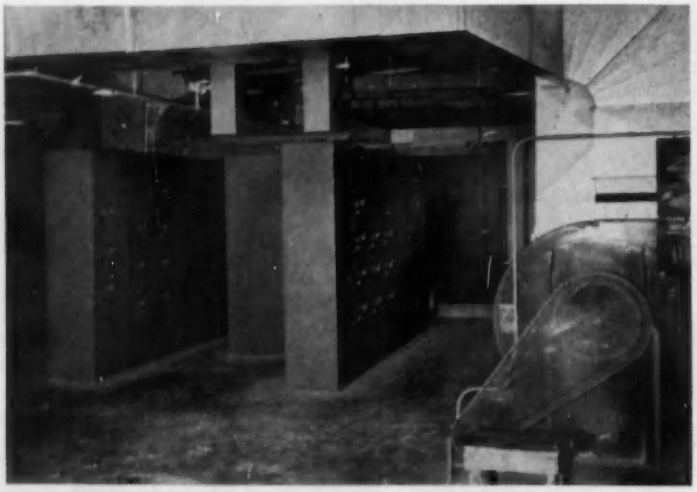
Arthur F. Weers, Weers Electrical Planning Service, Denver, Colo.

Both in electrical design to match its modern appearance and functioning and in construction methods the Denver Club building, located at 17th and Glenarm St., in Denver, Colo., is one of the newest and most interesting structures to change the Denver skyline. Twenty-three stories high, this building has taken its place as one of the two tallest in Colorado, fulfilling a growing need for more office space in Denver. The largest part of the building is leased to oil and investment companies, and it was around the needs of companies of this type that the electrical system was designed.

The basic need was for general lighting in office areas, power for local office equipment and building mechanical equipment, air conditioning being included. The lighting consists of a general office-type fixture widely applied. A flexible system of both lighting and 115-v power was reequired, because of individual requirements of the lessees. Flexibility in lighting was accomplished through the use of low-voltage switching, thereby necessitating only low-voltage wires looped down to switches in movable partitions. In this way, relocating a partition would require a minimum of rewiring. Flexibility in outlets for office equipment was achieved by means of an underfloor duct system with a pair of ducts being installed on nominal 6-ft centers throughout most of the floors. There are two panels on each floor, one of which serves the overhead lights and one the underfloor duct.

Power is served to the building by means of two vaults operating on a 13,800-v primary network. The lower vault serves power to the secondary distribution system feeding the first 13 floors. The upper vault, which is located on the 21st floor, supplies the second distribution system. This system feeds the 14th through 23rd floors.

The lighting main breaker for the lower floors is rated at 4,000 amp, three phase, with an interrupting capacity of 100,000 amp. A stepped system of protection was used, similar to a limited cascade. Subbreakers beyond the main were used, which are rated for 50,000 amp interrupting capacity. Each of these serves a 1,000-amp bus riser. From these risers panels were tapped off to the floors through high capacity fuses arranged in a tap box at each floor. These fuses act as backup protection and are in effect a protective



Switchboards near basement vault serve lighting and power for 13 lower floors, including air conditioning equipment adjacent.

Metering on the primary for both the basement substation and that on the 21st-story vault is centered remotely on the wall

transition step between the large air circuit breakers and small molded case breakers.

The upper distribution system is broken into two parts. The Denver Club organization occupies four of the upper floors and has its own distribution system from an 800-amp, three-pole main breaker. This main is rated at 50,000 amp interrupting capacity and serves a bank of smaller air circuit breakers of 25,000 amp interrupting capacity. Each of these breakers feeds a panel directly.

The other part of the upper distribution systetm is protected by a 2,000-amp air circuit breaker serving 400-, 800- and 1,200-amp submains. The other breakers serve bus systems to elevator equipment and lighting panels. Here again high capacity fuses are used as a junction from the equipment to the bus. The fuses used as protection from buses to molded case breaker panels were sized to prevent molded case breaker blow ups in the panels under short-circuit conditions. Because of this application, the operating curves of the fuses were the predetermining factor in selection rather than the current rating.

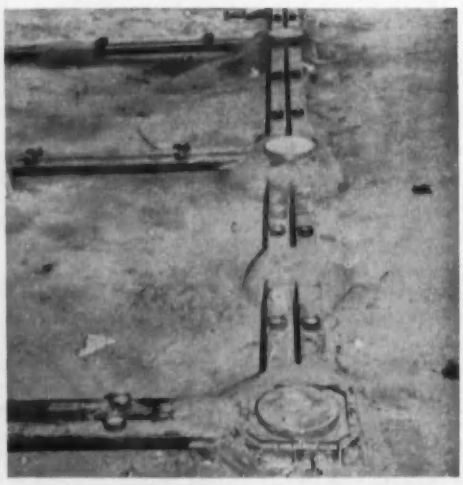
The purpose of referring to interrupting capacity of the breakers is to point out one of the most important and interesting features of the electrical distribution systems, one that has sometimes been ignored on jobs of this size. This is the application of breakers not only for overcurrent rating but for ability to interrupt safely large short circuit currents, a condition possible on network systems.

There was a large motor load requirement that had to be provided for. The air conditioning constituted a greater part of this load and was fed through a 54-circuit central motor control center. This control center required a 2,000-amp main breaker. In order to protect against short circuit effects within the control center, fuses were again employed. In every vertical section of bus a bank of fuses was provided.

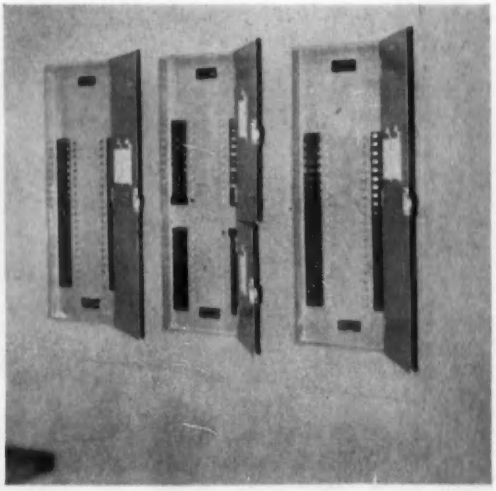
Some of the more interesting sidelights of the job other than those that have been mentioned are outside lighting, lightning protection and an obstruction light.

Outside lighting was provided at

Panelboards in room adjacent to the 21st-story transformer vault serve air conditioning, light and power for 14th to 23rd floors.



Pairs of underflow duct for office machines and telephones are on six-foot centers throughout all office areas in the building



High-capacity fuses between the 1,000-amp bus riser and the floor lighting and appliance circuit panels provide safe interrupting capacity of high order. Note also disconnecting switch. At right above are three circuit breaker panels serving one floor's needs

such locations as to floodlight the upper part of the building. This creates an attractive nighttime effect by bringing attention to the top face brick walls of the structure. A total of 31 Crouse-Hinds floodlights, 200-, 500- and 1,000-w, is used to do this.

The lightning protection system consists of rods at the top of the building, electrically connected to the vertical columns. These columns are in turn grounded at the base by means of ¾-in. by 10-ft ground rods around the particular columns grounded.

Electrical construction and installation also provided some unusual challenges and developed some methods to meet them by the contractor, Sturgeon Electric Co. of Denver.

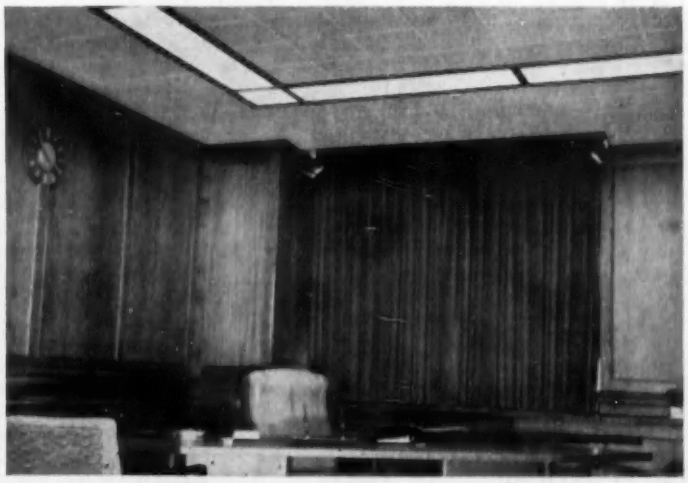
Because of a floor construction of Co-Floor, Ralph Johnson, manager of Sturgeon Electric, said that it was possible to prefabricate sections of the underfloor duct on the ground, lift the assemblies to each floor in sections and speedily install the duct.

Outlets for the lighting fixtures were roughed in as customary and set where specified in the furred ceiling expanded metal lath. But because the plaster was shot on with a sort of spray gun instead of being laid on in the customary manner a means to close the outlets and prevent the plaster from entering was needed. A long handled gadget was devised to push a wad of crumpled newspaper into each outlet box. When the plaster dried the wad was removed leaving a clean box.

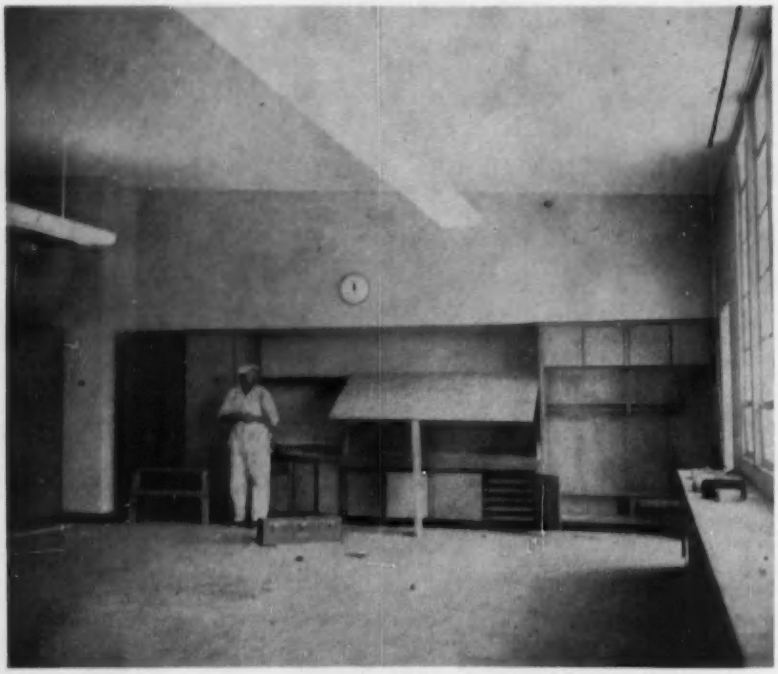
Another method that was devised to speed installation was the palletizing of the slimline fixtures as they were assembled. With a lift truck the pallet and fixture were raised to the ceiling, supporting it until bolted to the supporting studs.

Architect for the Denver Club building was Raymond Harry Ervin. The electrical engineers were Weers Electrical Planning Service. Mead and Mount Construction Co. were general contractors. The building is served by the Public Service Co. of Colorado.

The electrical system described here typifies that used in buildings of this size. The load provided for here is part of the electrical expansion taking place in the Denver area that should double the power company load within eight years.



Continuous rows of louvered slimline fixtures mounted on the ceiling are typical for all floors. Then with low-voltage switching, partitions can be moved as required by tenants. Flush-mounted fixtures in some of the private offices (right) are a special installation



Without sacrifice of essential classroom needs Santa Ana proves that heavy present . . .

School Costs Can Be Cut

by simplifying lighting and wiring design

John C. MacFarlane

Electrical Engineer, Santa Ana, Calif.

School costs have been rising so rapidly that the public is becoming aroused. Tremendous increase in school population makes necessary more school building construction. Throughout the West this has become a problem—to meet the growing number of youngsters, both brought in by migration and birth rate increase, as they are ready for schooling.

In California the school building program is one of the major items in construction and still these schools are not being built fast enough.

Protests over the custom-built nature of the California program have been voiced in the state legislature by several representatives, among them LeRoy E. Lyon, assemblyman from Orange County and chairman of the assembly education committee's subcommittee on public school costs. He has maintained that economy could be achieved by repetition and simplification of school design. He has been backed up by the experience of the Santa Ana Board of Education where, under the supervision of Dr. Lynn Crawford, superintendent of schools, and Dr. Oliver C. Lawson, assistant superintendent of schools, such a program was put into effect.

The part that the electrical industry can play in this is a simplification of the wiring and lighting systems and the clock and signal systems. In the Santa Ana program Dr. Lawson, in cooperation with local architects, worked for building and designs stripped of nonessentials and has been able to build 104 classrooms on what was considered a budget for only 98, including all-purpose rooms and administrative units. At a later date 58 classrooms, three kitchens and two all-purpose rooms were provided under the same program.

The cost of the school wiring system has not appreciably increased in the past five years. In spite of increases in the cost of labor and of material, intense competition on the part of contractors and material suppliers and increased efficiency in management and labor, together with more careful and better design on the part of architect and engineer, can keep these costs level. Little improvement can be expected in cost reduction from the industry at the present time. Competition is so intense that many electrical contractors are refusing to bid school work because it is being taken at an inadequate markup for overhead and profit. This has left the work to new contractors in the field and has increased the cost of supervision.

The reductions in school wiring and lighting costs must come from the architects, engineers and the various agencies who have jurisdiction over schoolhouse construction. At the present time schoolhouse wiring runs from $500 to $1,500 per classroom. As architects' calculations are based on per-square-foot of area the cost runs from 50c to $2 per sq ft or from 7 to about 20% of the project over-all cost.

The cost of this wiring may be broken down approximately into (1) services, subfeeders and panels; (2) wiring and trim; (3) fixtures; (4) clock and signal systems. It is obvious that the principal variable items are the services, subfeeders and panels, and lighting fixtures. The size and cost of the services, subfeeders and panels are largely controlled by state and local codes and the serving utility's regulations, and by the desires of the designer. The type and amount of lighting is largely controlled by the state office of schoolhouse planning.

However, the designer and school board can exert a definite control over the cost of the electrical work. In the following, I endeavored to show the relationship between the various parts of the wiring system and the savings that can be made to reduce the cost of the school. These data are based on actual costs, accumulated in the author's experience as an electrical contractor, estimator and consulting engineer.

Lighting System

The lighting of a school comprises the bulk of the cost of the electrical work. The following is a summary of the cost per classroom of the two principle systems of lighting. These figures are based on a new school consisting of eight classrooms. The concentric ring system is that approved by the state office of schoolhouse planning. The slimline system is a direct-indirect system having low brightness plastic louvers and side panels, and meets the requirements of the American Standards for public school lighting in a

Survey of Lighting Methods

Item	Method	No. Lamps	Type of Lamp	Lighting Total Watts	Estimated F-c Initial	Estimated F-c Maintenance
1	Concentric ring indirect	6	500-w Silver Bowl	3,000	27	18
2	Concentric ring indirect	6	750-w Silver Bowl	4,500	43	28
3	Concentric ring indirect	6	1,000-W Silver Bowl	6,000	60	39
4	Slimline indirect	24	F96T12, 430 ma	2,160	56	36
5	Slimline semidirect	12	F96T12, 430 ma	1,080	50	35
6	Slimline semidirect	24	F96T12, 430 ma	2,160	100	75

Approximate Cost of Systems per Classroom*

Item	1	2	3	4	5	6
Fixture cost	$ 60	$ 90	$ 90	$220	$180	$220
Lamp cost	15	30	30	60	30	60
Wiring	200	200	200	120	120	120
Clocks and bells	80	80	80	80	80	80
Panels	30	40	70	30	20	30
Home runs	30	40	60	30	20	30
Feeders	90	120	160	70	40	70
Service (1/8)	40	60	80	90	40	40
Master clock and signal (1/8)	100	100	100	100	100	100
	645	760	870	750	630	750

*Based on 8-classroom building

classroom of proper design (see accompanying table).

As may be seen, the lighting level produced by the two systems is approximately equal. Although the fixture cost is higher for the slimline system, the saving in wiring, feeders, panels and service far outweigh the fixture cost. This is true in spite of the provision in most codes that require the wiring to be adequate for incandescent lamps or approximately three times the needed capacity for fluorescent.

In many schools, extremely expensive government specification circuit breaker panel boards are used where the more competitive types are adequate for the job. Service and distribution panels may be of the switch and fuse type, for that matter, combining the main service meter facilities and subswitches in one panel with a reduction in cost and space.

Service and subfeeder conduits, especially where underground, may be nonmetallic conduit such as fiber duct, cement asbestos conduit or soapstone duct. Subfeeder conductors may be standard-type TW wire instead of the more expensive type RHW usually specified.

The cost of safety lighting of playgrounds and parking areas is not a significant item, if carefully handled. Usually the number of yard lights, using simple vaporproof units, can be reduced and the same is true of fire alarm stations.

To summarize some of the feeder and panel economies, the following are recommended.

Subfeeders—Use most economical sizes, such as three No. 2 in 1¼-in. conduit; three No. 3/0 in 2-in. conduit.

Use type TW wire instead of more expensive types.

Use nonmetallic conduit if possible.

Match wire size to fuse and switch maximums, such as three No. 6, 1-in. conduit, 60-amp switch, 50-amp fuse; three No. 2, 1¼-in. conduit, 100-amp switch, 90-amp fuse; three No. 3/0, 2-in. conduit, 200-amp switch, 175-amp fuse.

Load switches to 80% of rating on a maximum demand basis.

Figure voltage drop on conductors on maximum demand, not calculated connected load.

Panels—Use competitive-type circuit breaker panels but not residential grade multibreakers.

Install panels in janitors' closets and storage rooms to permit use of the type without door and lock as required for corridors.

Select locations to permit proper size of feeder and short home runs and permit most economical panel size.

Circuits—Load lighting circuits to 80% of rating in amperes, considering the effect of power factor of fluorescent-type lighting and voltage fluctuation on incandescent sources.

Convenience and appliance outlets should be circuited on a basis of probable use, loading to legal limit if the outlets have no probable load, but holding classrooms to two rooms per circuit.

Fixed appliances tend to increase greatly the size of panels, subfeeds and services because of state and code requirements that do not allow for a demand factor. This is particularly true of cooking and heating loads.

General considerations—Space should be left on the panels for future circuit breakers and in the main panel for switches for foreseeable expansion. Space should be provided and conduit be stubbed out to permit installation of additional service capacity.

Running of subfeeders and home runs underground will increase the dissipation of heat and provide spare capacity.

Use of the same size switch and types of receptacles throughout will make for economy.

Inexpensive flush fixtures of a competitive type instead of special designs and proprietary items will make for economy. These are available at local wholesale houses.

Design close to code requirements, exceeding it only when good engineering demands.

Prepare plans to suit the estimator and contractor, avoiding ambiguous or indefinite wording to prevent confusion and delays. Do not require contingencies. Make the division of work conform with the trade jurisdictions. Put everything in the plans and specifications required to estimate and install the job. Specify all fixtures and do not use allowances. Follow standard practices of the area and coordinate the work with the other trades on the drawings.

It is well to consider whether elementary schools really require some of the facilities that perhaps the high schools do. For example, it is not necessary to provide theatrical type of lighting on the stages of the auditorium or general purpose rooms.

Wrong Incentive

The method of paying architects and engineers on a fee basis on costs leaves little incentive other than pride and professional responsibility to contend with the problems involved and the obstacles to the design of economical school structures. Since this economy is based on careful design, calculation of the cost of alternate methods, constant negotiation with the authorities and analysis of the acceptability of the methods considered to the building industry, it is obvious that the designer is not rewarded, he is even penalized.

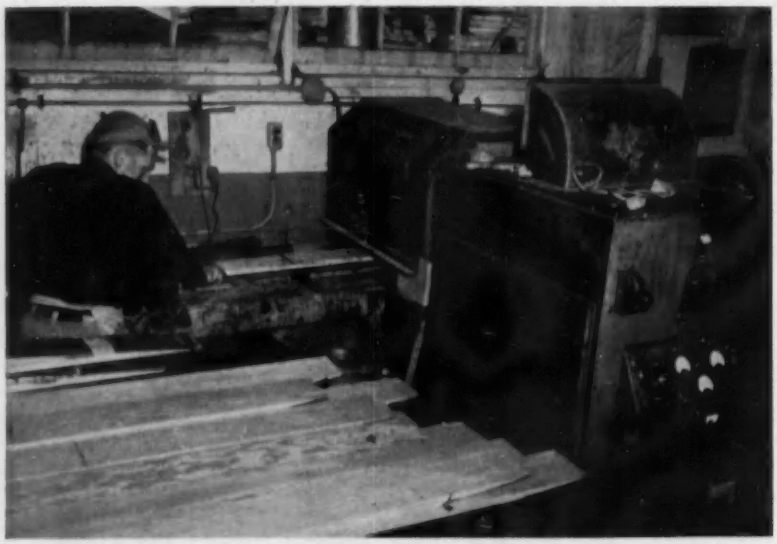
This situation probably contributes, along with a natural desire to do a nice job, to the condition vulgarly called by the construction industry "loading." The engineer by careful design and proper frugality with the taxpayers' money can keep the wiring within the budget. To do so, he should give consideration to suggestions above, proved by experience to have been effective in the schools in the Santa Ana area in providing adequate school housing at a modest cost.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION

Utilization Data Sheet No. 98

SUBJECT: High Frequency Joint Gluing
CUSTOMER: Bellingham Shipyards, Bellingham, Wash.
TYPE OF BUSINESS: Builds Wooden Mine Sweepers
SERVICE COMPANY: Puget Sound Power & Light Co.
DATA SHEET PREPARED BY: Phil Rosser

Assembly line where timbers up to 120 ft. long are fabricated for building wooden ships



Lumber used in high-frequency gluing machine forms timbers of any length and shape

Bellingham Shipyards is engaged in building wooden mine sweepers for the U. S. Navy and structural laminates for other construction.

Odd lengths of boards of white oak and Douglas fir are finished into pieces 20 to 120 ft in length on an assembly line, using scarf joints and radio frequency gluing. These boards are used as laminars for structural timbers. Scarf gluing with radio frequency permits the firm to build laminated timbers of any desired shape and length from shorter trees, shorter lengths of lumber and from inferior grades by sawing out knots, checks and shakes at high speed and relatively low cost.

Production — Boards are brought from a heated warehouse having humidity control and run through a cutting line to remove knots and flaws. From the sorting table each board goes through a straight line ripsaw and is cut to uniform width. Then a DeWalt scarfing machine cuts feathered ends.

From here the boards go to a Mann-Russell radio frequency curing machine. At this point a man drills holes for insertion of a hardwood dowel to maintain the position during curing. He spreads a thin film of resorcinol resin on the two surfaces, drives the dowel, applies the hydraulic press and operates the rf machine. Curing time is from 30 to 60 seconds depending upon thickness of the laminar. The finished boards glued end to end are run through a planer for surfacing to a tolerance of 0.005 in. and then are ready for any number of laminations —framers, engine girders, deck beams, foundation pieces, garboard strakes and others.

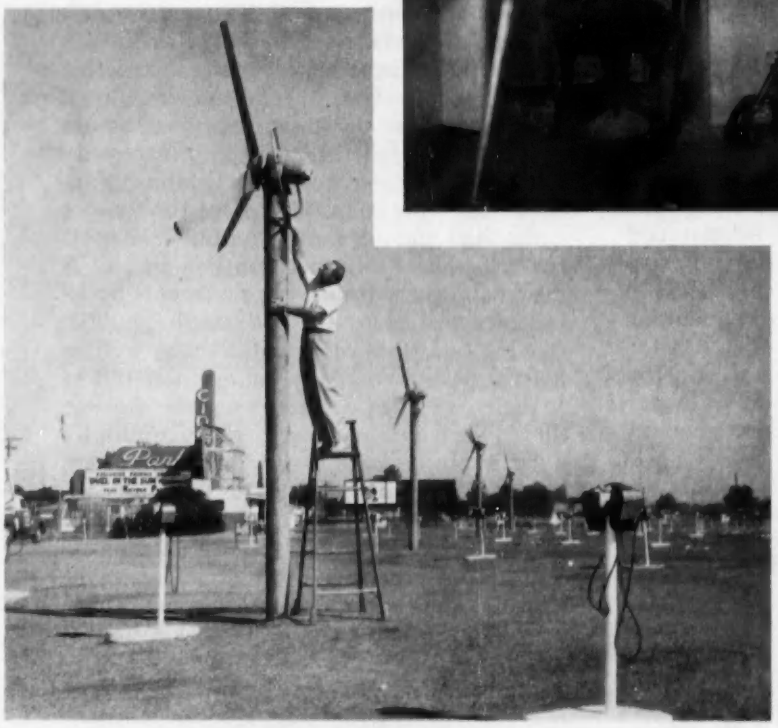
Equipment installed — DeWalt scarfing machine, 440 v, 7.5 hp; Mann-Russell press and rf generator, 440 v, three phase, 13 kw, with the following nameplate data: grid current, .3 amp; plate current, 1.2 amp; plate voltage rms, 5,150; 440 v, 100% pf at 13 kw; frequency, 27.12 mc.

The equipment is not separately metered and the best estimate of energy use is 7 kwh per hour for the gluing operation.

Good News for Contractors

- TV for AW
- Cool the Drive-ins
- Clean Policy

Live on one station, kinescoped for others, Wayne Mulcock of Utah Power & Light, Salt Lake City, shows TV viewers the importance of adequate wiring by explaining cords, fuses, wire sizes and devices in a series of five-minute spots for Utah and Idaho



Some drive-in theaters supply heaters in the patrons' cars for cold weather (see Electrical West, July p 88) but it took an Arizona one, Cinema Park in Phoenix, to provide evaporative cooling for hot nights with five 10-hp, 220-v fans on 14-ft steel standards, separately switched. Around the motor a 3-ft circle of tubing with pinholes drilled in it sprays moisture that is driven by the fan blades to increase the cooling effect. On humid nights the spray isn't used. Fans are made by Therm-Retain Corp. of San Jose for orchard protection against frost

Ira Beck gives his word and his bond that Central Electric Supply Co. of Denver will adhere to its long-time policy of selling only at wholesale. Failure to live up to this policy will bring payment up to $500 to any injured contractor for damages incurred. To let the contractors of the Rocky Mountain area served by this company know and feel certain about it, the company advertised the fact in an unusual way. It sent postcards saying, "There's no more guesswork—soon you can be certain," and "Yes, you can be certain when you get this important message," then followed a letter declaring its policy and a copy of its performance bond was enclosed. Here at right Ira Beck presents one to Bert Stiles, Rocky Mountain Chapter, NECA, president. Central has a complete fixture display to which contractors send their customers

ELECTRICAL WEST

Steam Power Seems Assured

MORE and more engineers in the Pacific Northwest are reaching the conclusion that fuel-generated power must be taken into consideration in planning for the future power requirements of that primary hydro region. Within recent months no less than a dozen pronouncements have set forth some of the advantages of a combined hydro-fuel power supply.

Present forecasts indicate a power deficit for the region that will become sizable in 1960 and will increase to 2,560,000 kw by 1964. Conclusions are that sufficient economical steam generation can be installed to firm up secondary hydro power so as to offset a large part of these deficits. The $120 to $150 per kilowatt of capital investment for steam as contrasted to $300 to $500 for hydro is an inducement to do this. So too is the cost estimate of 3.28 to 4.52 mills per kwh obtainable from large size modern thermal units.

For the hydro power zealots who only see federal financed water power as the energy source for the region, it may be later than they think. A 200-mw steam plant could be rolling in the Pacific Northwest in two years or less.

The Hoover Report on Power

REMOVE the heat, the dissent and the controversy that has enveloped the Hoover Commission Report on Water Resources and Power since its release last month and one salient fact emerges. The nation now has, for the first time in its history, a sane, sensible moderate program proposed for the development of its water resources. It is a program designed to benefit all of the people without sacrificing our basic social and economic system. To brand the report as "power company propaganda," as one dissenting member of the commission did, is to question the sincerity, integrity and fairness of the distinguished bipartisan group who made up both the commission and its task force.

Seven of the commission recommendations deal with federal power and hence are of major interest to the Far West where most of the federal development has occurred. These are the proposed policy changes: (1) Have the Federal Power Commission fix the rates for government power so as to repay the cost of the federal power investment and at the same time include equitable amounts to offset the full tax burdens now paid by private utilities. (2) Stop all federal construction of steam plants and transmission lines. (3) Change the preference clause to assure a fair share of federal power to private utilities and their customers. (4) Establish government corporations to replace the various authorities and administrations now in existence. (5) Have these corporations and TVA raise capital for future improvements by issuing securities to be sold to the public. (6) Include state representatives as well as federal on the boards directing these power agencies. (7) Let private enterprise furnish the capital for the power end of multiple-purpose projects and to distribute the power.

Most of the commission's findings are consonant with the Administration's declared power policy. However, the commission itself did not accept the recommendations of its task force that all federal power projects be sold or leased, and that the TVA be dissolved.

Basically the Hoover Commission report will help to shed light on several questions for which answers must be found in terms of legislative action and executive policy. The crucial question is whether or not the people of the U.S. want the federal government to dominate such an important segment of the economy as electric power. On this subject the report says: "Such competition . . . in the power field is more extensive than in any other single governmental field and has taken on many aspects which are the negation of our fundamental economic system."

However, competition is not the sole problem. "The tenor of task force finding is that where private enterprise is driven from the field in large areas, the federal government creates an element of monopoly in and must assume for all time the responsibility to furnish power to those areas." This, the com-

EDITORIAL VIEWS

mission finds, is outside the province of the federal government.

The Hoover Commission Report on Water Resources and Power fittingly fulfills the instructions given the commission by Congress. It was asked to make recommendations with respect to "abolishing services, activities and functions not necessary to the efficient conduct of government; and . . . eliminating nonessential services, functions and activities which are competitive with private enterprise; and . . . eliminating duplicating and overlapping of service, activities and functions." It has done all of these with respect to water and power. It remains now for Congress to implement its recommendations for the benefit of all the people.

An Exceptional Leader

A WESTERNER who attained national prominence from a humble beginning in the electrical industry was J. Scott Milne, who died in Portland last month. He was perhaps the most exceptional man the International Brotherhood of Electrical Workers ever had as its president. He was well known not only to his union but to the utilities and contractors through his organization work among their employees. But he was also known as a champion of private enterprise. The industry has lost a labor leader that understood the problems and needs of business, a rare man.

How to Get Good Engineers

ONE generally accepted method of helping eliminate the shortage of engineers and scientists is to interest more high school students in engineering careers. The specific means of accomplishing this have been difficult. However, the Tacoma Engineering Club has developed a program that can be applied in whole or in part by professional groups in any city.

Some of the elements of the successful program are an active speakers' bureau with competent people available for school assemblies and Parent-Teachers' Assn. meetings. Then there is a coordinator for each junior and senior high school who works closely with teachers and counselors. They also arrange for interviews between students and an engineer qualified to help them in their chosen field. Finally there is an annual student night banquet when seniors who have selected engineering as a career are guests of the club, along with their principals, science teachers and counselors.

Success of the program, which started in 1952, is attested by the 1955 banquet when more than 100 students attended. The 1952 dinner attracted but 30.

For those engineering groups in Western cities who are looking for a practical program to build interest in the profession the Tacoma program is worth emulating.

THE federal government should never assume the responsibility of supplying the electric energy requirements of any area. Therefore, private utilities individually and jointly must explore every possibility to meet growing needs for electric energy. I am convinced that the electric industry, which was envisioned by private business men as having magnificent possibilities for service, and which was nursed to maturity through long and difficult years, cannot now afford to sit idly by while a noisy group of political power promoters demand exclusive rights in the development of our power resources. Our situation demands that we proceed to meet our power needs in a most vigorous and progressive manner. We must do this not only to satisfy a ravenous consumer appetite for electric energy, but also that we may survive as an essential bulwark in America's future growth. If we build these partnership plants, we will use them to promote progress and stability. We pledge ourselves to this public trust, and that's the way it should be.—Kinsey M. Robinson, president, The Washington Water Power Company.

O. B. Wilt shows Enterprise 24-in. oven to Debby Dahlen, Miss Chico, who was handing out air cooler promotion. In McCormack showroom R. D. Stoddard, Los Gatos (nearest set), and John Bower, service manager, demonstrate CBS-Columbia color TV

Market Brings Buyers

Though not so lively for electrical people as the winter market, last month's summer market in San Francisco's Merchandise Mart indicate that the public is still in a buying mood and that interest in color and built-ins continues. Most dealers were writing orders.

Copper and stainless-steel kitchens were more in evidence and pink seemed to be leading other colors. Some manufacturers are offering ivory or off-white shades for those who may not want to tie themselves to a definite color prefer a compromise that will fit any scheme. White exteriors with colored interiors were holding their popularity in refrigerators and freezers.

Good crowds were on hand to watch the CBS color TV programs in the McCormack display room, where it was reported that color sets were selling in this area, at full list with no trade-in.

Philco was in its new Mart quarters (former Meyberg space) where it has set up offices and displays.

Another newcomer to the Mart was Montag, whose products were being shown by National Electric Supply Co. Made in Portland, surface units and ovens are available in porcelain and stainless steel; overs in copper as well.

Completed shortly before the market and seen by many dealers for the first time was the Crosley-Bendix Copper Glow kitchen, which occupies the entire back section of the Crosley space.

The reception and cocktail party, sponsored by the electric and gas industries as a summer substitute for the customary Appliance, Radio and TV dinner, drew a large crowd.

The accompanying photos show a few of the electrical displays. In addition to the ones on these pages, a cover picture shows Joe Burns, district manager, giving a pitch in the Telechron booth.

New Crosley-Bendix Copper kitchen was on display with Phyllis Larsen and Frances Alexander to show it off. Westinghouse cleaner

is suspended as if by magic but Christine Dent, home economist, and Max Awisus, who planned the display, won't tell how

Features of Kelvinator's Foodarama were pointed out to Larry Greer and Marty O'Connor, PG and E, by Donald J. Frye, Kelvinator district manager. Norman L. Stanghellini, National Electric Supply Co., shows Montag built-ins to Dan Alexander, PG and E

Frigidaire's Betty Smith shows summer specials to Sal Blasquez, Sterling Furniture Co., as Bill Cronin and Robbie Robertson, Frigidaire, look on. J. H. Fletcher and Ed Halliday, San Francisco, and Bob O'dell, Oakland distributor, give the Packard-Bell story

W. J. Gilmartin, Jackson Furniture Co., outside Philco's new Mart headquarters, operates remote control tuning display. R. J. Garrett, PG and E, Oakland, looks over Thermador display, as Ralph H. Larsen, Frank Edwards Co. sales manager, tells oven features

By using only three types of replacement elements, Washington Water Power program . . .

Speeds Water Heater Recovery

Market survey predated program, which includes new heater element; flat rate conversion charge

W. A. Lowry*

Residential Sales Supervisor
Washington Water Power Co.

Although the electric industry has been talking proper sized heaters for a good many years, times have changed and our problems have changed with them. In the good old days BQR (Before Quick Recovery) our companies, manufacturers and distributors furnished charts and handouts to determine the proper size water heaters. We checked the number in the family, the size of the home and, allowing for their living habits, were able to recommend an adequate sized water heater.

To insure satisfactory hot water service we went a few steps further. We recommended the proper locations, the size of pipes, the need for insulation and the proper thermostat adjustments. Again, we were fortified with literature on the advisability of considering all these factors.

The net result of this constant process of education was a steady improvement in water heater installations. Custom-built homes were nearly always contacted in sufficient time to insure proper sized equipment. This same educational procedure with our dealers plus those we contacted personally gave reasonable assurance that the majority of replacement tanks purchased were also adequate.

In the builder market we found an ally in the lending agencies. FHA maintained a constant surveillance on water heating specifications. It was able to legislate (in a sense) what we were recommending to our customers. These specifications do not always result in ideal user satisfaction because the ultimate buyer was unknown when the installation was made but they did produce an installation standard far above that which could have been achieved through our own personal contacts.

These facts are substantially true in the various areas that our companies serve. Water heating installations had improved over the years and it seemed that we had done a fairly good job. But there were disturbing elements on the horizon that prevented any feeling of complacency.

Use Increasing

There were still a large number of small, low-wattage heaters on our system. Over the years, hot water consumption had shown a slow but substantial increase. Automatic washer sales were growing by leaps and bounds; dishwasher sales had finally shown signs of improvement; the higher standard of living, the tendency toward larger families and prosperity itself were all contributing factors to this increased need for more hot water. Then FHA published its new specifications for water heaters. These requirements were stated in such arbitrary manner that we could no longer rely on their adequacy. And if this weren't enough, there was prospect of natural gas in the very near future. Here is what the company did to study and alleviate the problems.

In the midst of this growing concern, the high-wattage, quick-recovery water heater was proposed. With its superior performance, sales advantages and public appeal this type heater certainly would be a partial solution to our problem.

The rate and engineering departments studied the load characteristics and the technical aspects that the acceptance of this heater would have on our system. Tentative approval was followed by an official filing of revised water heating specifications in February 1955. The company now has quick-recovery tanks on its lines.

There were a few anxious moments when this acceptance first went into effect. Local wiring codes would not permit 4,500-w elements on No. 12 circuits and therefore two sizes had to be made available; the two 400-w elements to satisfy the replacement market and the two 4,500-w units for new installations. Our inspectors required warning tags on all interlocks to discourage tampering. They also de-

* From a talk before the Business Development Section, Northwest Electric Light & Power Assn., in Salt Lake City, May 10.

manded name-plate designations that clearly indicated an interlock and wattage totals that reflected the maximum load rather than the sum of the elements. Example: upper element 4,500 w (x), lower element 4,500 w and total connected load 4,500 w, **not 9,000 w.** These requirements were simple to meet but instigated some harrowing experiences for dealers, distributors, manufacturers and the company. Now that is past and part of our concern is over.

No Panacea

However, the quick recovery was not a panacea. We were still worried. What about all the people who had small tanks? Would they buy a quick-recovery water heater? Or would they struggle along until the tank sprang a leak or worse yet until the gas man made them a proposition? We thought we should devote some time and effort to this group.

First, how many customers had small tanks? How many of them were dissatisfied? The answers ran the gamut from very, very few to a staggering percentage of our total customers. Each of us had an opinion but no one had the facts.

That was our first order of business. We must compile some facts on our present water-heating customers. The modus operandi went something like this: a letter to the manufacturers of the popular heaters in our territory asking for their sales of 30- and 40-gal tanks over the past few years (these were the potential trouble makers); an investigation to determine the number of water heater complaints received through our own service department and representative dealers; interviews with salesmen to establish the number of times water heater dissatisfaction came up on sales calls; and last, but by no means least, what approach would our gas competition take to this market.

The answers were not always to our liking or as complete as we would have liked to have them. There were too many small tanks still in use, the evidence indicated strongly that 25% or more of our customers were using either a 30- or 40-gal water heater. How many were dissatisfied users? Complaint calls, which included burn outs, averaged 150 to 200 per month. A survey-type question was asked at Home Ec demonstrations: "Do you ever run out of hot water?" More than 50% answered yes. Salesmen's response was varied. Water heater dissatisfaction had been expressed on many calls but often settled satisfactorily. However, the sum of all the evidence indicated an appreciable amount of dissatisfaction. We had recently instituted a survey type of call where customer's equipment was surveyed and cataloged. Here would be a source of a great deal of helpful information. We could call back on small-tank owners and determine the adequacy of the installation. But should we raise a question in their minds without a solution? We felt that we must have an economical, simple solution.

Those who were in a position to buy a replacement tank could be sold a quick-recovery heater. Whether they called us or the dealer direct they would receive an adequate water heater. Customers who would not spend that much money were the ones we must work on and a program was developed for this group.

The various types of water heaters fell into three distinct types: the wrap-arounds, the immersion and the well type. There were variations but substantially all water heaters fell into one of these groups. How each of these could be converted to higher wattages at small expense was our goal. A maximum of $20 was set as the most anyone would agree to spend on a tank. There was a host of problems to be whipped: old ball tanks; lack of uniformity in manufacture (especially war-year models); availability of conversion elements in proper wattages and sizes; wiring capacity in the home; interlocks; capacity of existing thermostats and switches; mechanical problems such as draining tanks, removing limed elements and wells, servicing wrap-arounds, short and long elements, etc. Then there were the questions of unusual tank locations; how to contact the customers, the costs of doing the work and finally the billing and collection policy that should be adopted.

The Solution

The solution we submitted and are presently using is this: conversion of existing tanks to a maximum of 4,000 w and removal of any load-limiting devices still in operation at a flat rate, depending on the type of tank.

Water heater specifications had been liberalized over the years but prior to the recent change 40-gal tank requirements were 1,500 w for the upper element and 1,000 w for the bottom element. The plan was to double the wattage of the upper element wherever possible. This would be the most economical. However, some types of tanks did not lend themselves to this method.

The immersion-type heaters represent the greatest number of brands (more than 100 different makes) but not necessarily the greatest number of tanks on the system. These are comparatively easy to convert. Chromalox replacement elements would do the job. The flat rate for draining the tank partially and making the upper element change from a 1,500-w to a 3,000-w element was set at $15.

The wrap-around-type heaters were of two general kinds: those that could be serviced without removing the jacket and those that required removal of the jacket. Most of the first group could be changed for $10. The second group costs an additional $7.50 or a total of $17.50.

The well-type heaters were in a class by themselves. There were two choices. The first was to remove the well and with the aid of a reducing bushing install a Chromalox 3,000-w replacement element. This was the cheaper method but it presented many serious contingencies: the weld might break, leaks might develop and the warranty would be void. Therefore we decided on the second method: removing both existing elements and replacing them with two 2,000-w elements. This is more costly from a material standpoint but the additional expense is offset by a lesser labor charge. The replacement of wattages has proved satisfactory. Price on this conversion is $17.50.

Prices on Trial

All prices are on a trial basis until more experience is gained. Each type of conversion was tested on employee installations before offering it to the public. In every case, satisfactory water heating performance resulted from these changes.

Now we were ready to embark on our program. The prices had been determined. Terms were to be 90 days with no carrying charge. Availability of replacement elements had been assured. Everything was in readiness.

The program was presented to our salesmen. Contractors were notified of the plan and all of them were asked to follow this same procedure of replacing elements on burn-out or trouble calls. They were told that this was an experimental program, which would receive no general advertising, and if it should prove highly successful would be turned over to them in the future.

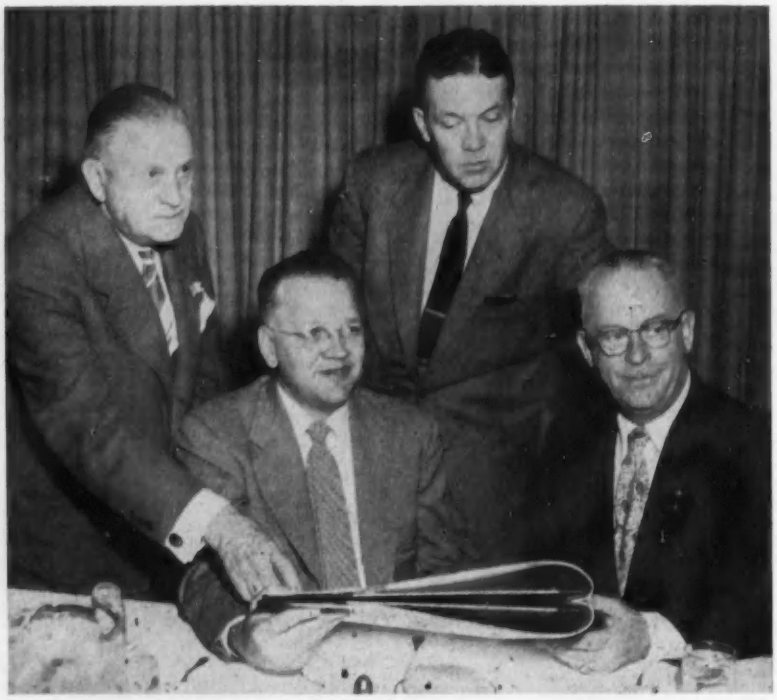
When this was written, we had been contacting customers and making conversions for about one month, with indications that we were on the right track. We had some delays in receiving elements, in spite of previous assurances that they were available. We encountered some unusual installations and learned that the salesman on his original contact cannot guarantee that the job can be done for the flat rate or in some cases that it can be done at all. Therefore he takes the order and tells the customer that the price will be so much if conditions are normal. The

serviceman makes the conversion if normal. If it is unusual, the serviceman explains the difficulty to the customer. If it can be converted he tells the customer the cost of doing this particular job. In either event there is no charge unless actual conversion is made.

There were 40 conversions made during the initial month. A preliminary survey indicates complete satisfaction on every conversion. Now we are confident that we can seek out our dissatisfied hot water users aggressively and offer them this simple, economical solution.

Cost figures are not available at this time. However, we have set up an account for this purpose and will have information available later.

In conclusion, I should like to emphasize that the complete answer to the job of selling new load and maintaining present revenues must not overlook those customers who are not in the market for a new water heater but are not completely satisfied with their present hot water service. Sell them a conversion job—it means satisfaction and possibly more kilowatt-hours.



Committee members for the Exposition of Modern Living in Oakland, Oct. 1-9, include LeRoy H. Bennett, show manager, Northern California Electrical Bureau; Wayne Thompson, city manager; Douglas Aiken, Pacific Gas and Electric Co.; Paul Morrison, Gas Appliance Society of California. A new diamond floor plan and colorful exhibit backgrounds have been designed to provide more workable and practical displays and reduce over-all cost. Exhibits will be staffed by retailers with some 70,000 sq ft being devoted to electric and gas displays. The show will be opened by turning on new spectacular lighting for the Oakland Auditorium, a cooperative venture between the city and the electrical bureau

Freezer Campaign In Hawaii

Sponsored by the PCEA Electrical Living Committee and tying in with Edison Electric Institute's program, a 13-week food freezer campaign is being sponsored on the Island of Oahu.

This cooperative advertising program, which started July 1, is keyed to current market information indicating that 4.4% of the Honolulu population intends to buy a food freezer during 1955. This means 2,430 units and the industry intends to sell of these and more.

Participating distributors, dealers and Hawaiian Electric Co. are sponsoring 390 one-minute TV spots featuring Freezer Freddy, a character rigged up in Eskimo outfit. An animated cartoon and musical jingle accompanies each spot, the jingle being available for radio.

A live Freezer Freddy is being promoted by the three TV stations for use of distributors, dealers and utility. Under guidance of the Food Freezer subcommittee, he appears in store demonstrations, at weekly cooking schools conducted by HECO and elsewhere.

Each participating dealer receives a Freezer Freddy Kit supplied by distributors and containing banners, signs, window posters.

An entertaining exhibit designed to teach visitors the value of adequate wiring was displayed recently at the Phoenix Home Show by the Salt River Power District. Leo Z. Sherman, behind counter, and Phil Clemons, talking to Sherman, designed the exhibit. Idea of the game was to have players plug in "appliances" without blowing a fuse. If they were able to do so, they won a 150-w light bulb. The booth attracted about 3,000 persons in the 10 days of the show. Thousands more were told about adequate wiring via telecasts

ELECTRICAL WEST Sales Guide

News Letter

August 1955

FOR THE ELECTRICAL MERCHANT OF THE WEST

Business good

Chances that 1955 would end up as the best business year yet for the home goods industry were considered good by more than one speaker at San Francisco's summer market. Checking off reasons for optimism, A. Cameron Ball, Mart manager, gave these figures: residential construction in the West last April was 15% above April 1954; six-month sales at retail level are variously reported at from 5 to 30% ahead of last year; personal income was up $7.5 billion and consumer spending up $11 billion during the first quarter; 1,600,000 new marriages are predicted for the West during 1955.

What was shown

In appliances most of the new lines were not yet on display floors but low-cost specials with de luxe features were being pushed by several manufacturers. Electrical dealers came early and came to buy. Frigidaire had some specials on the floor and an impressive display of summer promotion material. . . In the McCormack space emphasis was on color TV and the hot-weather special offered by CBS-Columbia--a clock-radio free with each purchase of an Advanced 1600 TV receiver. A 22-in. rectangular color tube was expected for the fall; probably will be franchised to manufacturers. . . Hotpoint has a new low-cost 10-cu-ft combination refrigerator-freezer designed to help dealers meet competition. It has a separate 75-lb food freezer, two separate cooling systems and automatic defrosting. . . A Hamilton Jubilee washer-dryer combination priced as a unit was offered in the J. J. Lukanish Co. space. . . Kelvinator was featuring its Foodarama, which will hold 166 lb of frozen foods, has 11.2 cu ft of refrigerator space, special provision for hard-to-refrigerate items. . . Stromberg-Carlson had its new International all-wave portable; was showing new TV cabinet styling with marbelized tops. . . Packard-Bell displayed new 21- and 24-in. table TV models. A lock-in base converts the 24-in. to a consolette. . . For more information on the summer market and pictures see pp 96-97.

New space--new models

Shown in Philco's new Mart space but presented earlier in the month by Dallman at San Francisco were top-touch tuning, a remote control unit available for TV at $10 extra; a dealer kit for displaying it (see picture on p 97); 17-in. models in four cabinet colors. Philco is now showing its transistor portable phonograph in a standard and a de luxe model. Three transistors replace all vacuum tubes. The machine will operate on four standard flashlight batteries; will play 3,000 45-rpm records on one set; uses a printed wired chassis and 4-in. speaker. Printed circuits to give more compact chassis and larger tone chambers are being used in small radios, which come in a choice of 13 colors. Philco says it will come out with color TV sets this fall.

In another Bay Area distributor showing last month, Leo J. Meyberg presented the Norge 1956 line, including a new automatic clothes dryer with Hamper-Dor loading chute, which can be used also as shelf for sorting and stacking; automatic washer with Resudser to save soapy water for additional loads, two complete washing cycles to handle either regular or special-care fabrics.

Another showing

First stereophonic music system for home use was introduced by Ampex Corp. of Redwood City, Calif. To give the direction and depth of a live performance, two separately recorded sound tracks are played from a single tape through two separate amplifier-loudspeaker systems. Model 612 tape phonograph and two model 620 amplifier-speaker systems come in compact, well-designed cabinets for use in bookshelves or on tables and at prices starting at $699. In Samsonite carrying cases, the system costs $694. The phonograph is sold also without audio amplifiers or speakers to be connected into existing high-fidelity systems. Commercially recorded stereophonic tapes or standard tape recordings can be reproduced.

First for home

Herbert Salem, Healdsburg (Calif.) Music Shop, won the Thunderbird sweepstake prize and J. P. Guastella, Palmquist Electric, Helena, Mont., the $1,200 trip in the Westinghouse dealer sales contest. In addition to the two top prizes dealer salesmen in the 11 Western states and Hawaii received six major appliances and 36 $100 bills. Headed by Walter Baker, Pacific Coast manager, Appliance Division, Westinghouse officials and industry and press representatives attended the drawing; watched while thousands of entries were dumped into an automatic washer-dryer, throughly mixed before the winning names were picked.

Dealers win

In a consolidation move, Frigidaire has taken its regional sales offices from the San Francisco Merchandise Mart to the Oakland branch headquarters, 1250 53rd St. W. H. Baldwin goes to Denver as branch manager, Frigidaire Sales Corp., and will be replaced in Oakland by W. I. Buchanan, regional sales manager, who has been in San Francisco. Factory representatives covering the Pacific Coast area will be housed at Oakland. Display space will be retained at the Mart.

Move

Regional headquarters for General Electric's major appliance division have been moved from San Francisco to San Mateo. New address: 436 Peninsular Ave.; telephone number: Diamond 2-2054.

New address

In a new pricing policy, Emerson has abandoned geographic differentials; will pay freight charges, round tags to the nearest dollar, sell each TV model at one price, regardless of finish. Customers in the West probably will save from $10 to $20 a set. Emerson's 1956 line includes a 21-in. color TV receiver to list at $894; remote control tuning; 14-in. portable a-c d-c TV set.

One price

Following cancellation of distributorships reported last month, Thor announced that it could not match national advertising money with larger appliance manufacturers; indicated that the new washer to be introduced in the fall would be advertised locally by stores handling the line. Thor is reported to be considering purchase of companies not in the appliance field.

Economy move

A new company, Whirlpool-Seeger Corp., may be formed by Seeger Refrigerator Co., RCA and Whirlpool Corp. It would take over operations of Seeger and Whirlpool (Coldspot refrigerators and freezers, Kenmore and Whirlpool laundry equipment) and the stove and air conditioning divisions of RCA. Sears-Roebuck would be a stockholder.

Merger talked

Fair Trade stand

Dramatizing its stand against Life's recent "fair trade" editorial, Toastmaster sold copies of the magazine from its National Housewares Show booth in Atlantic City for 5¢, 75% below cover price. Carrying on its fight against price cutting, the manufacturer last month took action against two Los Angeles retailers on grounds they had failed to live up to fair trade agreements.

Drop lines

Sues, Young & Brown, Los Angeles, has announced that it will drop merchandise handled by multiple distributorships; will devote itself exclusively to Zenith, Norge, Lewyt and Vornado, all fair traded.

Yule drive

Because last year's campaign is credited with increasing major appliance sales from 20 to 40%, U. S. Steel will sponsor a second industry-wide, six-week Operation Snowflake, with the slogan "Make It a White Christmas--Give Her a Major Appliance."

News from manufacturers

Hamilton Beach has announced a five-year free service guarantee on all its motorized home appliances. . . A new manufacturer of electric housewares and appliances, Modern Age Electrical Industries Co., has been organized in Detroit; will market a table fry pan as its first product . . . Chambers, long-time gas range manufacturer, has introduced a line of electric built-in ranges in stainless steel or copper finishes and claiming a retained heat oven feature. . . Hotpoint will increase retail prices on five major appliances about 3% to offset increased price of materials.

More new products

Designed as a companion to the 11-cu-ft upright freezer, Crosley's new Shelvador 100 will be strictly a fresh food storage appliance, with a small compartment for ice cube trays. . . TV sets featuring tip-top front control dials on a sloping panel above the picture screen and horizontally mounted printed circuit boards have been introduced by Westinghouse. . . Frigidaire has developed a smokeless, odorless oven for household electric ranges; has not said when it will be available. . . John I. Paulding has designed an electric clock outlet with recessed back for cord and a steel hanger. . . G-E has added a new color, Holiday Pink, to its Christmas lamp line.

Video recorder

An electronic video recorder being perfected by Bing Crosby Enterprises in Hollywood will take live TV shows off the air, compress them on a half-inch tape carrying both picture and sound. Tapes probably will be sold through regular retail outlets; will be threaded into a special viewing device on TV sets.

Load builder

Westinghouse Lamp Division is offering utilities an illuminated house number as a residential load builder. Continuous operation gives an additional annual load of 175.2 kwh, has a favorable effect on load factor, it is claimed.

Show dates

Dates for the Pacific National Exhibition in Vancouver, B. C., are Aug. 24-Sept. 5. . . San Diego Bureau of Home Appliances will hold its fall conference on Sept. 14; its 18th annual electrical and home appliance show from Nov. 25-30.

Six-month record

Arizona Public Service is planning a four-week promotional campaign to introduce the electric frypan. Feature is direct selling by PS employees, with all sales channeled through local dealers. The utility reported first six-month sales 30% above the same period last year. Appliance sales have been exceptionally good, with laundry equipment a leader and TV holding up better than expected, it says. Air conditioning unit sales of all types are ahead of last year.

Salt River Power District has voted to join the Phoenix Appliance Merchandisers Assn. Phoenix AMA activities coming up include a Radio and TV fall festival at the fairgrounds, tying in with NARDA promotion. Bruce McAndrews, Packard-Bell, and Byron Payne, Arizona Public Service, are heading up the committee. The group expects to have Mort Farr, NARDA chairman and Darby, Pa., dealer, as speaker on Sept. 10.

New member

NATA is sponsoring a Profit Clinic at the Benjamin Franklin Hotel in Seattle on Sept. 22. Mike Wood is general chairman. Speakers will include Mort Farr, NARDA board chairman; Dan Packard, McCann-Erickson market analyst; George Johnson, Minneapolis appliance and TV dealer; T. O. McDavid, v-p, Commercial Credit Corp.; Ed Heggerty, Westinghouse sales training director.

Profit clinic

At the half-way mark in its Operation North Pole, dealer cooperative program, El Paso Electric had reported 197 food freezers and 266 air conditioners sold. . . Washington Water Power's Kitchen Whiz range campaign had netted 2,000 ranges, 1,145 in Spokane division, in the preliminary report. . . B. C. Electric has added about 2,400 residential customers with take over of distribution facilities in three communities adjacent to Power River and one on Texanda Island; will continue existing rates and restrictions on additional appliances until it completes transmission line in late 1956, can supply 60-cycle current to the area.

More utility news

Ruth D. Kruger, Arizona PS home service director and PCEA home economics committee chairman, has released the program for a Know-How Clinic to be held at the company's home service department in Phoenix. Latest techniques will be demonstrated by manufacturers.

Know-How clinic

Westinghouse has transferred H. E. Hugo from San Francisco to St. Louis. He has been regional sales development manager, appliance division, will be Southwestern regional manager of portable appliances. . . Robert S. Sloan has been made Western sales manager for Norge. Robert N. Arnold is regional manager. . . Jim Murphy, Kelvinator representative in San Diego for several years, has been promoted to zone manager at Seattle. . . Charles C. Galliano has rejoined J. J. Lukanish Co. . . R. J. Parr, formerly with the San Francisco Chronicle, has joined Dallman Co. as advertising and sales promotion manager. . . Clay Hixson, formerly with G-E Supply, more recently with Connelly Acceptance Corp. at Seattle, has been named general manager of the F. B. Connelly Co. of Oregon, TV and major appliance distributor.

About people

Bob Armstrong, Phoenix manager for Gough Industries, died recently at age 38. . . Sues, Young & Brown has made Lewis W. Johnson field sales manager, Norge division, John C. Houseman, field sales manager, Zenith division, a new post. . . Elizabeth Adams has joined Washington Water Power as home economist, replacing Jean Ensor, who is going into extension service work. Janet McNair and Betty Means have been added to the WWP Spokane division home service staff. . . Woody Weinert, formerly with Frank Edwards Co., has organized the W. J. Weinert Co. in Oakland to distribute Ironrite. . . R. J. Stansky is now manager of Kapiolani Furniture & Appliance in Honolulu. . . Clem Stearns, who was publicity supervisor in sales promotion and information department, WWP, is doing special work for the Pacific Northwest Power Co.

More about people

Pacific Gas and Electric placed second in poster and painted bulletin divisions of San Francisco's outdoor advertising contest. . . W. Morishige, Kapahulu Appliance, Honolulu, won a $50 U. S. Savings Bond in NEMA's 1955 Electric Fan Window Display contest.

Winners

Delegates see exhibits and get product information at PCEA industrial heating conference

Know-How Sells Kilowatts

Ability to recommend the proper electrical equipment will help utilities tap a great industrial potential

Increased power sales await the utility that can help industrial customers select the proper electrical equipment for their processes, according to representatives of manufacturers of electrical heating equipment.

The representatives emphasized this as they exhibited their products at a June industrial heating conference of the Pacific Coast Electrical Assn. in Los Angeles. More than 200 attending the meeting had opportunities to see the exhibits and hear about recent applications of the equipment.

Also represented at the meeting were three national engineering societies, AIEE, ASME and AWS, who cooperated with the PCEA in staging the conference, and the Electrical Maintenance Engineers Assn. of Los Angeles.

Infrared and far-infrared heating applications were detailed by George L. Larson, Sprayking Inc., who said a more nearly uniform temperature in a 0.25-in. thickness of enamel over a black metal base is achieved with high-temperature infrared (2,500 k) than with a lower temperature source. This applies even though the two sources have the same watts per square inch heat density, he said. Wherever thermomechanical shock is a factor, or for drying glass products and skins or food processing, Larson said low-temperature infrared is most efficient. He also stated that gold-plated infrared reflectors, with a 98% reflectivity factor and the best resistance to corrosion, are most in demand.

Dehydrating processes are best served by far-infrared equipment, according to A. M. Tompkins, Montgomery Bros., representing the Edwin L. Wiegand Co., because water readily absorbs far-infrared energy. Applications he listed included the production of V-belt pulleys, where selective switching of pairs of heaters was used to maintain proper temperatures in preheat, baking and curing ovens.

Frost heaving of the foundations of cold-storage and frozen-food plants can be prevented with the use of mineral-insulated, copper-sheathed heating cable buried in the ground, according to C. A. Seville, Nelson Electric Mfg. Co. Seville also told of an installation of heating cable along the door track of an airport hangar to prevent icing.

H. E. Oswald, Montgomery Bros., said owners of a textile mill placed 550 kw of electric heating in the plant air conditioning duct and saved $10,000 when compared with the cost of an equivalent steam heating installation. He said lower operating costs should result, too.

Applications of electric heating in a chemical fertilizer plant were described by C. K. Massey, Westinghouse Electric Corp. Strip heaters eliminate deposits of chemicals in a pipe line from an outside storage tank, tubular heaters on spray mixing nozzles prevent clogging and heaters on line feed pumps ease the pumping load, Massey said.

Scale formation or deposits of constituents on electric sheath heaters can be prevented by the use of a corrosion-resistant sheath and by selecting the proper watts per square inch heat density, reported B. W. Depew, Heating Engineering & Supply Co.

The case history of a customer of Pacific Scientific Co., detailed by E. C. Buckingham, showed that expensive vacuum heat-treating equipment was paid for in 10 months with the reduced number of rejected products. He emphasized that the type of process should be carefully studied before recommending this type of equipment because of the relatively high investment.

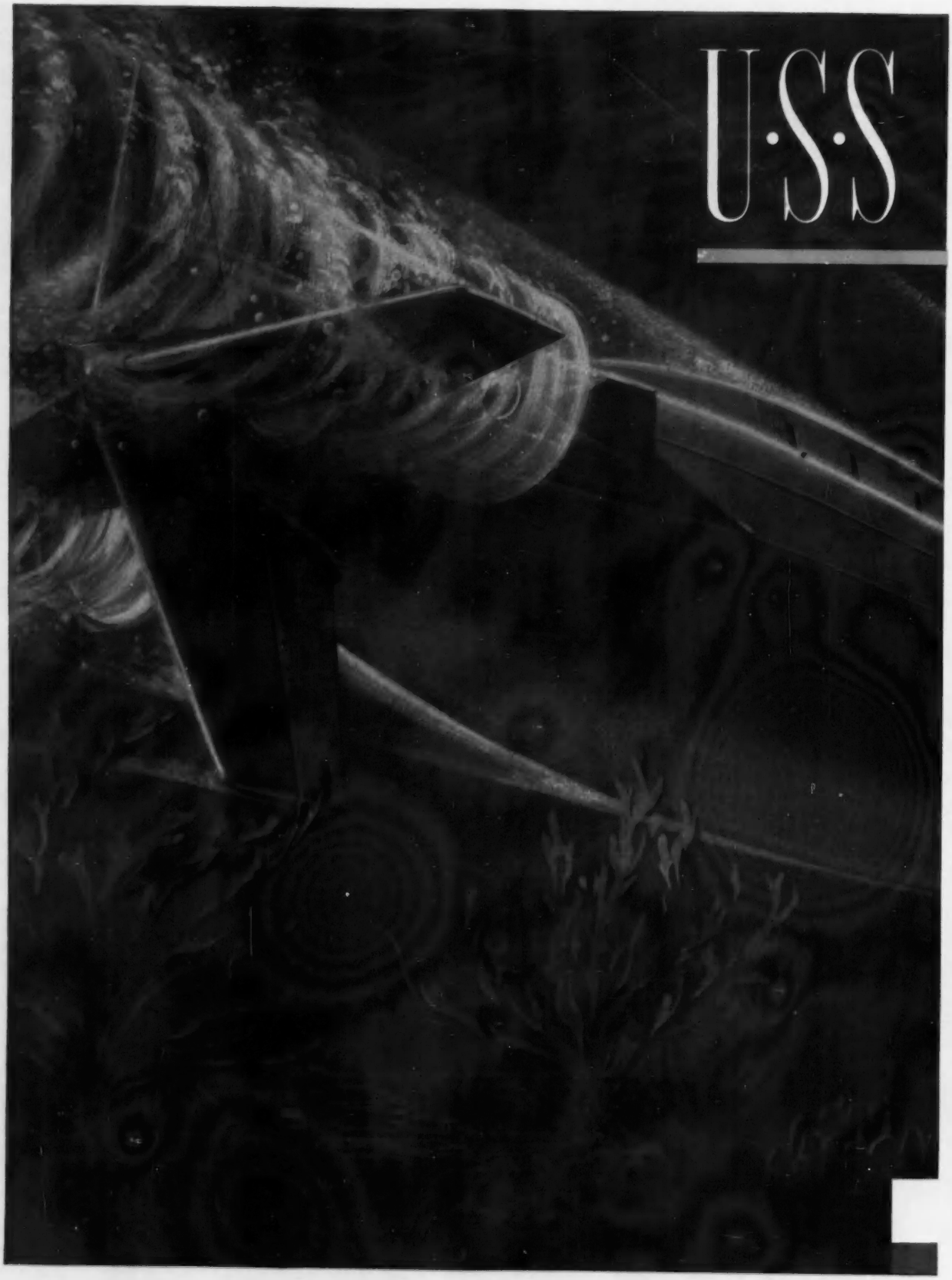
Parts with complex, irregular surfaces can be cleanly joined with electric furnace brazing in an atmosphere of pure, dry oxygen, reports Ray Bryant, General Electric Co. Standard and stainless steel, cast iron, copper, silver, a few aluminum alloys and some magnesium alloys can be furnace brazed, he said.

Leigh N. Call, Call Equipment Co., told the group that resistance heating of metals is more efficient than fuel-fired furnaces and that this process reduces the formation of scale.

For the food industry, A. N. Swenson, Peeco Corp., recommends dielectric heating for sterilization and pointed out that there is a great potential market for this application. Another good potential for dielectric heating is sealing plastic packages, according to Swenson.

The 50-54% lagging operating range of low-frequency induction heating makes power factor correction a "must," Lombard Smith told the group. He represented the company of the same name. Pipe welding with induction heating was described by Harlan A. Messner, Tocco Division, Ohio Crankshaft Co.

A. W. Nash, Ajax Electric Co., said nonferrous melting with line-frequency induction furnaces has advantages like high metal recoveries, almost perfect temperature control and reduced maintenance and down time. He said higher first costs, higher operating cost and hot charging must be considered before recommending this installation. He also said that induction galvanizing of continuous steel strips has high capacity for a given size.


U·S·S

Nautilus

first
atomic submarine
uses

TIGER BRAND ELECTRICAL CABLE

The Nautilus was built by General Dynamic Corporation's Electric Boat Division shipyard, at Groton, Conn. She was launched on January 21, 1954.

Very frankly, we cannot recall a more *critical* application of electrical cable than this new atomic-powered submarine. And from one end to the other, this amazing boat is laced with Tiger Brand Electrical Cable.

But here's the important thing—*you* can get the same quality that went into the Nautilus. Just call your American Steel & Wire salesman.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL
GENERAL OFFICES: CLEVELAND, OHIO

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB!

paper & varnished cambric cable
asbestos wire and cable
shovel & dredge cable
mold cured portable cord
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USS Tiger Brand **ELECTRICAL WIRE & CABLE** USS

UNITED STATES STEEL

Halliday · Cawlfield

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Machine Accounting Discussed

Purchasing and Accounting groups, NWEL&PA, meet in Vancouver, B. C., to study procedures

Machine accounting, with emphasis on the new electronic machines, and a case study of B. C. Electric Co.'s practices and procedures in several departments, were features of the Accounting & Business Practice Section meeting of the Northwest Electric Light & Power Assn. held in Vancouver, B. C., June 22-24. Thomas Chambers, B. C. Electric, section chairman, conducted the general sessions, while J. S. Purves and Vic Jones, also of that company, handled the general accounting and the customers accounting sessions when the meeting broke up into parallel groups for special studies in those fields.

Purchasing, Stores

This was the first year in which the purchasing committee met with the accountants, and this committee under L. C. McIver, Puget Sound Power & Light, participated with the general accounting group and also held its own shirt-sleeve sessions on purchasing and stores problems.

Through the medium of movies and illustrated talks, the application of electronics to utility revenue accounting was explained by J. King, T. M. McDaniel and R. M. Simpson of Arthur Andersen & Co. This feature was brought out at the opening session after a welcome by George Cunningham, alderman of the city of Vancouver, and Lorn McLean, vice-president and chief financial officer of the B. C. Electric, and response by R. C. Setterstrom, Montana Power, president of the association. Setterstrom emphasized the growing importance of machine accounting, which has opened so many avenues for simplification of procedures and savings in time and cost of business and statistical analyses. He pointed out the great need for prompt and accurate accounting reports to aid management in speeding decisions.

Public Relations

Another feature of the opening session was a masterful analysis of the elements involved in a public relations program, and the media through which each element in the picture may be reached. This was presented by Gerald M. Brown, publisher of the Vancouver *Herald*, who minced no words in pointing out some of the industry's mistakes public relationswise in the past.

General Accounting

When the meeting broke up into parallel groups, general accounting heard E. F. Wildfong, Portland General Electric, analyze the records needed to apply the new methods of depreciation permitted by the 1954 revenue code. He concluded that what was needed was what most companies already have—sufficient information to allow them to make a reasonable determination of the average life and dispersion type of each group of mass property.

In a panel on reports to management, with J. E. Anderson, Puget Sound Power & Light, moderator, J. A. McDougall, California Oregon Power, discussed reports of sales; J. S. Lang, B. C. Electric, took up general statistics and graphic methods; F. C. Brown, Pacific Power & Light, showed which reports of operating departments were prepared in his company; and A. B. Gilbertson, California-Pacific Utilities, discussed reporting to top-level executives.

Pay roll procedures occupied a portion of the afternoon session with an explanation of a new method of pay roll accounting by machine given by A. O. Opgrand, California Oregon Power. In this method few machine hours were substituted for many manhours previously needed. A panel on pay procedures, with J. A. McDougall of Copco as moderator, brought out many procedures used by other companies.

Uniform System

Another panel on the uniform system of accounts was conducted by M. M. Ilch, Idaho Power, while minor material accounting was discussed by L. C. McIver, Puget Sound Power & Light.

In the closing session, all manner of staff problems were aired in a panel headed by L. E. Beard, B. C. Electric, while S. B. Peach of that company explained procedures for approving and paying suppliers' invoices.

A report on ten-month operation of bimonthly billing in Utah Power & Light Co. by E. H. Halliday was a feature of the customer accounting group meeting. The company is now

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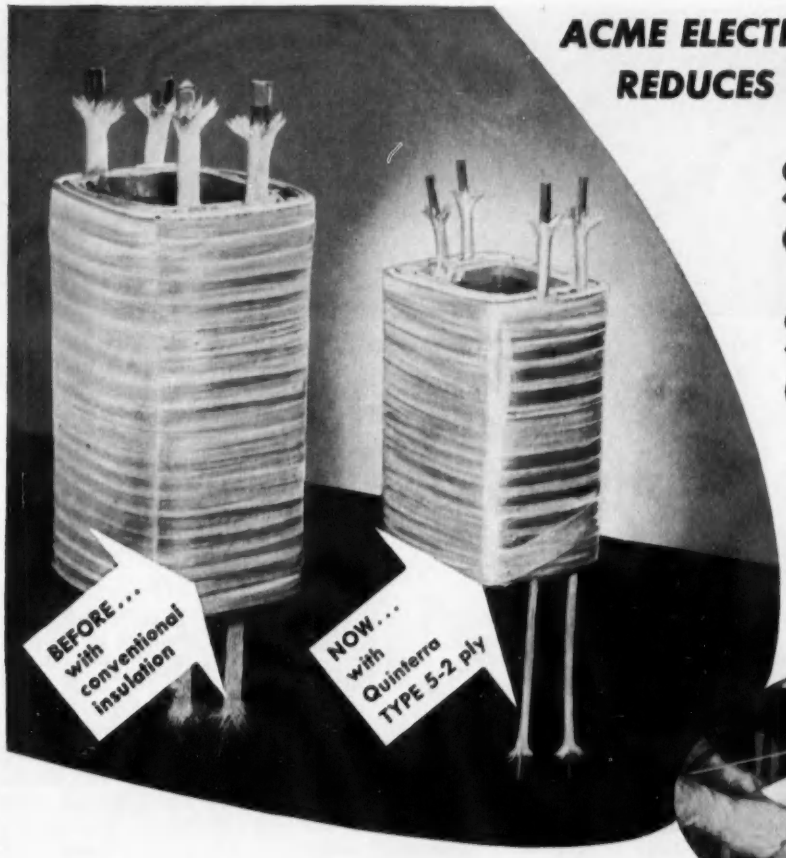

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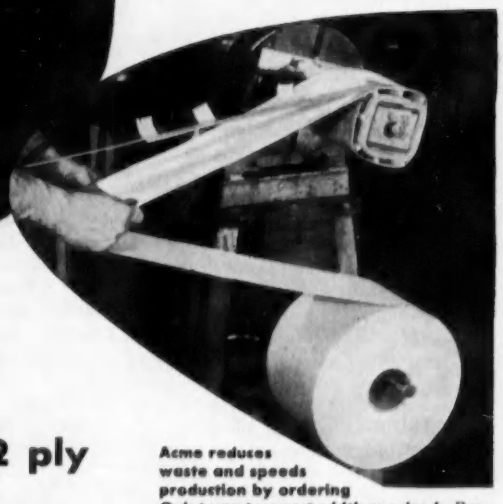

Acme reduces waste and speeds production by ordering Quinterra to exact width required—Production efficiency has been increased and waste has been reduced to an absolute minimum—without equipment changeover—by using Quinterra Type 5-2 ply, factory-cut to Acme's dimensional specifications.

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billing about 95% of all its customers (98.6 of residential) on a bimonthly basis and has realized a saving of 80¢ per customer per year, based on the total number of customers served, or 85¢ per customer considering only those customers billed bimonthly. This has been accomplished without loss of customer good will or any depreciation in public relations.

Budget Billing

Washington Water Power's experience with budget billing was explained by C. A. Caulfield of that company. No definite conclusions as to the merit or demerit of the practice have been decided.

Other parts of the customer accounting program consisted in panels on credit and collections conducted by W. N. Rowberry, Idaho Power, and one on cashiering and pay stations by R. R. Tweedie, B. C. Electric. Several EEI training films designed for employees in customers relations work were shown. The group also took an afternoon to visit B. C. Electric Co.'s IBM customer accounting installation, where local employees stood by to explain the operation in detail and answer questions.

A feature of the entertainment program was a boat ride on a Canadian Pacific ship from Vancouver to Nanaimo and return, with dinner and dancing on board. This feature was in the hands of E. S. Gardiner and Graham Blyth of B. C. Electric. Mrs. Thomas Chambers was hostess to the visiting ladies.

• **Jay Kaspari** is the new president of the **Sacramento Valley Electric League,** succeeding Chet Coppin; Rex Moore is vice-president. Phil Galen, Arthur Banchero, James Bauman, Fred Sage are new directors; Bob Moore and William Cahoone carry-over directors.

• **George C. Sopp,** assistant manager, Los Angeles Department of Water & Power, addressed the **Engineering Association of Hawaii** June 3.

Distributors Ready Convention

With both a strong program and a beautiful setting the Victoria, B. C., Western Regional annual convention of National Association of Electrical Distributors has already enlisted more than 250 advance registrations, according to W. M. Jewell, manager, Pacific Zone. It will be held in the colorful Empress Hotel, Sept. 25-28, and will follow the pattern of the last convention in San Francisco.

Nationally prominent speakers to appear on the program will include: R. C. Bennett Jr., vice-president, National Electric Products Co., Pittsburgh; Rev. L. David Cowie, world traveler and inspirational speaker, pastor of University Presbyterian Church, Seattle; Louis M. Nichols, business consultant, who will discuss cost studies in the distribution field; Jean Vuillequez, vice-president and director of sales, American Metals Co., who will tell of the copper situation.

President Lester Barrett of NAED will discuss the potentials in the National Adequate Wiring Program, in which he has been a leader. Arthur Hooper, executive director of NAED, is also scheduled for an address.

From the West itself there will be several speakers. Thomas Mellon of Wesix Co. will talk on "BTUs in the Till," the possibilities of electric heating business. Garlan Morse, director, Pacific Coast Sales for Sylvania Electric Products, will discuss lighting sales potentials. M. M. Wheeler, housewares Western regional manager, General Electric Co., will discuss electric housewares sales opportunities. W. R. Grasle, Portland electrical contractor, regional vice-president for District 6, NECA, will give views of mutual contractor-distributor problems.

At the chairman's dinner, for members only, A. H. Gudie, Biddle Trade Bureau, Los Angeles, has been asked to discuss "Managerial Survival." John Newton, past president of NAED from Oakes Electric Supply, Holyoke, Mass., will also speak.

The program, preceded by registration on Sunday, begins with member meetings on Monday. A general session Tuesday morning and similar open sessions for members and guests will be held morning and afternoon on Wednesday. The golf tournament will be on Tuesday afternoon and chairman's dinner that evening. Irving P. Bean is regional vice-president and chairman of the Pacific Zone. A banquet and dance will close the convention Wednesday evening. An interesting ladies entertainment program is planned, including a tea at Butchart's Quarry Gardens.

Reservations are being made through W. M. Jewell's office, 126 Post St., San Francisco. He reports 250 advance registrations by the end of July. Likewise the membership of NAED in the West has grown in the past year. He reports 14 new electrical wholesalers have joined since the last convention and there are prospects of a few more soon.

A series of area meetings has just been concluded with one that almost was a convention in itself at Ranch Santa Fe, near San Diego, in July. Rear Admiral Carey, retired, and A. H. Gudie addressed the meetings. There was golf and a dinner dance and 78 attended. It was the third series of such area meetings in the year.

E. W. Arnott, vice-president, B.C. Electric Co., will welcome the convention to Canada and the members of Canadian Electrical Distributors Assn. have been invited to join. Sightseeing trips are being arranged for the ladies and members.

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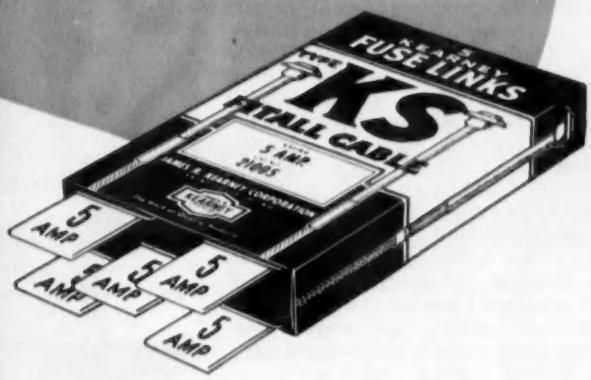

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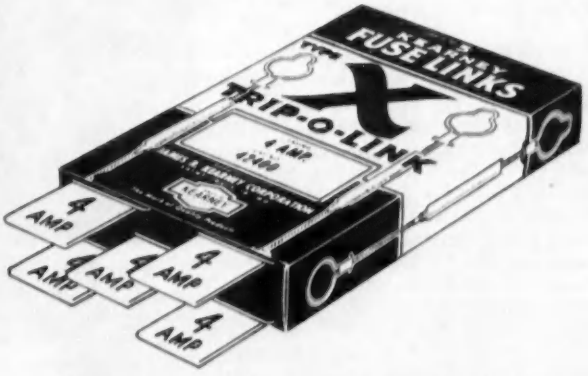

KEARNEY Type X . . . specially designed to keep transformers in service during overloads and surges . . . yet to protect before the damage range is reached. Opens 230% of rated current load within five minutes.

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Quick Catch Up

RMEL Convention

Its annual joint picnic with the NECA over on Aug. 5 at Elitch Gardens, Denver, the Rocky Mountain Electrical League turns its attention to the annual convention at Jackson Lake Lodge, Moran, Wyo., Sept. 11-14. An exceptional program of nationally prominent speakers has been arranged. It will include Harllee Branch Jr., president, Georgia Power Co.; Sherman R. Knapp, president, Connecticut Light & Power Co.; Edgar H. Dixon, president, Middle South Utilities Inc.; J. B. Thomas, president, Texas Electric Service Co.; Paul B. McKee, president, Pacific Power & Light Co.; Robert R. Gros, vice-president, Pacific Gas & Electric Co.; Hon. Milward L. Simpson, governor of Wyoming; Dr. W. E. Shoupp, Westinghouse Electric Corp., Dr. Preston Bradley, author and lecturer; Kenneth Haagensen, Allis-Chalmers Mfg. Co.; and John F. McDaniel, vice-president, Hotpoint Inc. The convention will close the season at this new Rockefeller lodge and hotel resort, which opened this spring. Reservations are being made through the RMEL office in Denver, according to Ralph Hubbard, manager.

Inspectors

The two Western sections' annual meetings of the International Association of Electrical Inspectors will be held in Bellingham, Wash., and Riverside, Calif. **The Northwestern Section,** presided over by John C. Hewitt of Seattle, meets Sept. 12-14 at Bellingham Hotel, according to announcement by W. L. Gaffney, secretary-treasurer. Ed Tubbs of Bellingham is general chairman, John O'Rourke chairman of housing, Howard D. Myers of Seattle chairman of finance, Herbert N. Ballard of Bellingham chairman of program and D. D. Dunhaver, Bellingham, of entertainment. Reservations are to be made direct to the Bellingham Hotel. Howard D. Myers of Seattle is handling the exhibits.

Southwestern Section meets the following week, Sept. 19-21, at the Mission Inn, Riverside, and will be presided over by Ben Wheater, Long Beach chief electrical inspector, section chairman. A program is being developed by Secretary-treasurer Lou La Fehr of Alhambra and arrangements are also being made for an exhibit of new manufacturers' products.

Arizona Chapter elected H. M. Clark of Glendale as its chairman, L. Waggoner, Arizona Public Service, Phoenix, secretary-treasurer, and as vice-chairman B. Strube, Prescott, and C. B. Parker, Phoenix, and R. Fossbender, Phoenix. Clark succeeds A. W. Thomas. The chapter also set dates for the meetings into next year. The Sept. 24 meeting will be held at Prescott, Nov. 12 at Glendale, Jan. 14, 1956, at Casa Grande, March 10 Tucson and May 12 at Show Low. A canvass of the city officials in the state is being made by letter, to ask the extent of enforcement and an expression of policy regarding code enforcement.

Southern California Chapter held its traditional May meeting in Long Beach, home of the section president, Ben Wheater. Harry Dobson of Santa Barbara presided. E. E. Carlton, supervision electrical safety engineer, Division of Industrial Safety, explained the major changes in the State Electrical Safety Orders. Don Carson, G-E application engineer, described 480-v lighting systems, after which Harold Welton, Southern California Edison distribution engineer, and Wayne Banning, Los Angeles Department of Water & Power design engineer, explained their respective service requirements for 480-v lighting systems. Both utilities serve 480-v from ungrounded delta second-

Idaho Chapter inspector officers pictured at a recent meeting included S. N. Jeppeson of Driggs, vice-chairman, fourth district; Don Baird, Caldwell, retiring chairman and now executive committeeman; Park Forte, Boise, executive committeemen; Bill Hopper, Boise, toastmaster; and Mark Lundy, state inspector, Boise, secretary-treasurer, IAEI

When three IAEI chapters met for their annual meeting at Modesto chairmen were: (seated) Del Hanson, Oakland, No. Calif. Chapter; R. V. Jones, Fresno, Central Calif. Chapter; Ben Wheater, Long Beach, Southwestern Section president; Wesley Peterson, Sacramento County, Sacramento Valley Chapter. Behind them are Secretaries Ken Bliss No. Calif. Chapter; Clyde Smith, Central Calif.; C. E. Jarvis of Sacramento Valley

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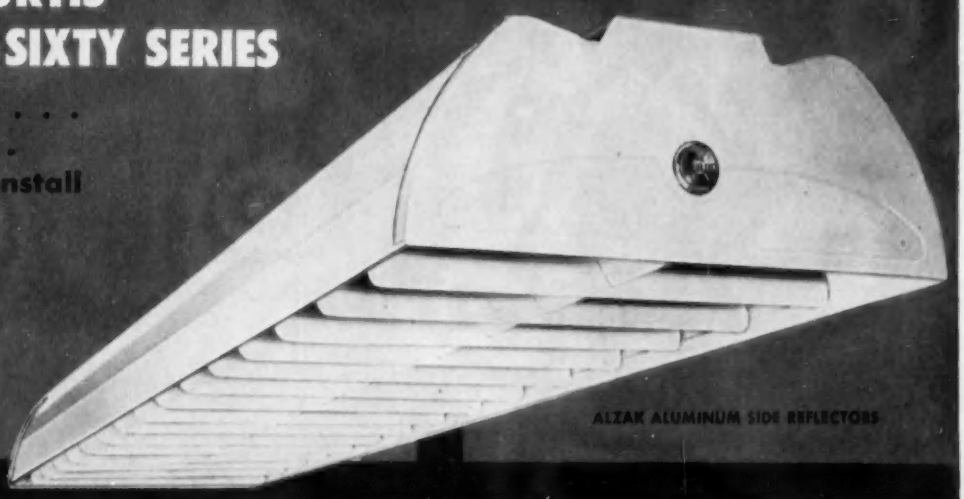

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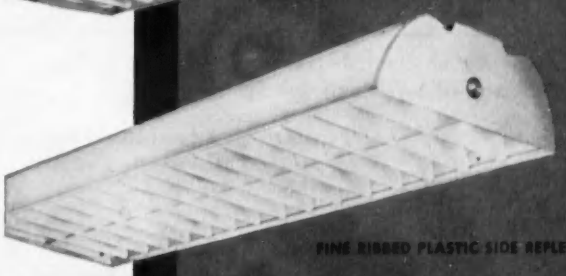

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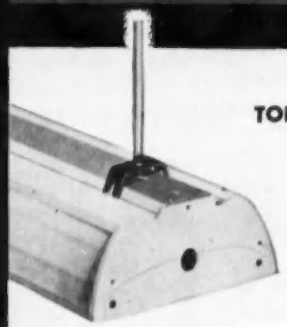

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Annual dinner dance, June 16 of the Los Angeles Chapter, NECA (above), brought out many well known old-timers: Stanley R. Brekhus of San Bernardino, Ran Doll, Glendale, Max Fry, Hollywood, Andy Anderson, San Bernardino, Cliff Allen and R. H. McCormick, Pasadena, M. N. Shansby, Los Angeles, Emmett Swearingen, Santa Monica

Right: Newest is San Mateo County Electric Club, organized by W. J. Varley, manager, Peninsula Electrical Contractors Assn., on June 1, with Tom Whittaker, Capuchino Electric as president (standing). With him on the platform were Chet Hefner, county inspector, a director; Everett Marshall, contractor, acting secretary for George Erskine, engineer (absent); Ken Rexford, Tecco Appliance Co., director; Tom Savasta, Savasta Supply Co., vice-president; W. H. Diederichsen, IBEW manager, director; Jack Shirely, Sierra Mfg. Co., also a director

aries and permit customer grounding devices only in plants served from an individual transformer bank. Los Angeles requires the user's transformer to be protected by a circuit breaker interlocked with the main breaker.

Northern California Chapter, presided over by Delbert Hansen, Oakland chief inspector, heard an interesting proposal by John Thompson of the Berkeley inspection department. He recommended that the association present to realty boards and property owner groups a voluntary program that any houses offered for sale be examined at the time of ownership to check up on the wiring. This would be similar to present termite inspection. Before a sale was consummated, all hazardous wiring could thus be eliminated. This proposal will probably be presented to the Southwestern Section at the annual meeting. Unit kitchen assemblies prewired and equipped with a circuit breaker panel in the sink cabinet came in for considerable discussion. Before any action is taken, the split-top range committee is to make a report next meeting.

1955 Association Meetings Scheduled

August

15-16—**American Institute of Electrical Engineers,** Hotel Finlen, Butte.

24-26—**Western Electronics Show and IRE Convention,** Civic Auditorium, San Francisco.

September

11-14—**Rocky Mountain Electrical League** annual convention, Grand Teton Hotel, Jackson Hole, Wyo.

12-14—**International Association of Electrical Inspectors, Northwestern Section,** Bellingham Hotel, Bellingham, Wash.

19-21—**International Association of Electrical Inspectors, Southwestern Section** annual meeting, Mission Inn, Riverside.

22-23—**Northwest Public Power Assn., Accounting Section,** Tacoma City Light Auditorium.

26-28—**National Association of Electrical Distributors,** Empress Hotel, Victoria.

October

1-8—**Northern California Electrical Bureau,** Electrical Exposition, Oakland Civic Auditorium.

20-21—**Northwest Public Power Assn., Power Use Section,** Seattle City Light Auditorium.

November

3-4—**Pacific Coast Electrical Assn., Business Development Section,** Huntington - Sheraton Hotel Pasadena.

9-10—**PCEA - Hawaiian Section,** Honolulu.

16-17—**PCEA—Administrative Services Section,** Californian Hotel, Fresno.

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PANORAMA OF THE PCEA

Sections Plan Year's Work

The recent two-day conference by the Power Utilization Committee of the PCEA's Industrial Heating Conference was termed an outstanding success. (See page 105.)

Administrative Services Section

The Administrative Services Section of the PCEA will hold the first of two conferences at the Californian Hotel in Fresno, Calif., Nov. 16-17, 1955. Chairman is F. W. Mielke Jr., Pacific Gas and Electric Co.; vice-chairman, J. A. Talley, California Electric Power Co.

The first conference will be held in conjunction with the Pacific Coast Gas Assn. and will be a five-part program. Subjects to be covered:

1. Integration of customers accounting and collection activities in preparation for electronics. Sponsoring the program will be J. W. Vanier, Southern California Gas Co.

2. Responsibility or cost accounting with electronic machines; sponsor, Bevans Jones, Arizona Public Service.

3. Payroll plans for processing with electronic machines; sponsor, Robert Connors, San Diego Gas & Electric.

4. Auditors' place in electronic accounting; sponsor, C. E. Sauers, Southern California Edison Co.

5. Building, design and maintenance for electronic and mechanical equipment; sponsor, C. W. Hanson, San Diego Gas & Electric.

The Administrative Services Section's second meeting will be held April 18-19, 1956, at the Sheraton-Huntington Hotel, Pasadena. Subjects to be covered at this meeting are:

1. Financial — Discussion will be held of where money comes from, how to use it, its effect on the soundness of the company, etc. Material covered in this talk will be of interest to power utility company representatives and other business representatives. Sponsor will be William T. Quinsler, Arizona Public Service.

2. Legal—Functions and operations of a utility legal department will be outlined and discussed; sponsor, Joseph E. Sheeks, PG and E.

3. Right-of-Way and Land—Included will be a discussion of federal aid, highway construction, working with planning commissions and normal problems encountered by utility company right-of-way departments; sponsor, A. L. Cleveland, Southern California Gas.

4. Stores—Organization and management of tools, equipment and supplies; sponsor, Harold Swanson, PG and E.

Operating under the Administrative Services Section there will be five committees: committee on revenue act of 1954, Peter Lubisich Jr., Southern California Edison, chairman; uniform system of accounts, J. S. Green, Southern California Gas, chairman; paperwork management, R. R. West, Southern Counties Gas Co., chairman; insurance, Carl F. Smith, Southern California Gas, chairman.

At a later date a chairman will be named for the committee on overheads, engineering and supervision, administration and general.

Business Development Section

The Business Development Section's annual conference will be held at the Sheraton-Huntington Hotel in Pasadena, Nov. 3-4, 1955, with Jack Kiedaisch, Arizona Public Service, chairman and D. S. Aiken, PG and E, vice-chairman.

Residential Group — H. L. Moore, Southern California Edison, presiding. Kitchen and laundry committee; chairman, John St. Lawrence, General Electric Co.; vice-chairman, W. P. Harrison, Sues, Young & Brown Co. Residential wiring: chairman, John R. McNeese, California Electric Power Co.; vice-chairman, W. M. Gribble, Thermador Electric Co. Home lighting: chairman E. W. Meise, San Diego Gas & Electric; vice-chairman, C. E. Ginochio, PG and E. Home economics: chairman, Ruth D. Kruger, Arizona Public Service; vice-chairman, Mary J. Kelly, Philco Corp.

Commercial and Industrial Group—D. S. Aiken, PG and E, presiding. Industrial wiring committee: chairman, C. D. Bronson, California Electric Power; vice-chairman, George Larsen, Larsen-Hogue Electric Co. Commercial and industrial lighting: chairman, J. Roy Jones, Westinghouse; vice-chairman, C. D. Buchanan, Fluorescent Fixtures of California. Commercial and industrial power utilization: chairman, W. R. Lambirth, California Electric Power; vice-chairman, W. L. Greer, PG and E. Agricultural electrification: chairman, G. H. Sullivan, Edison company; vice-chairman, J. C. Porter, G-E.

Engineering and Operating Section

The Engineering and Operation Section will meet in San Francisco Aug. 26, 1955, to lay plans for the annual conference that will be held in northern California in the spring of 1956. Guidance committee: chairman, F. E. Bodine, Westinghouse; vice-chairman, J. F. Sinnott, San Diego Gas & Electric. Named as members-at-large to the Engineering and Operation Section are: C. L. Ryan, Southern Nevada Power Co.; C. D. Ramsden, Pacific Coast Engineering Co.; D. F. Roach, Westinghouse; F. H. Rose, Allis-Chalmers.

Communications Group — Sponsor, R. L. Brinton, PG and E.

Hydroelectric Generation — Sponsor, D. P. Dinapoli, PG and E.

Underground Distribution — Sponsor, B. L. Peter, PG and E.

Steam Generation—Sponsor, J. B. Moore, Southern California Edison.

Systems Operation—Sponsor, J. H. Drake, Southern California Edison.

Meter — Sponsor, R. E. Marshall, California Electric Power.

Transmission and Distribution — Sponsor, T. H. Phillips, Arizona PS.

Transportation — Sponsor, D. K. Madison, San Diego Gas & Electric.

Engineering and Design—Sponsor, K. M. Bausch, Bechtel Corp.

Substation—Sponsor, W. S. Moody, G-E.

Accident Prevention Committee—Chairman, Carl L. Yager, PG and E.

• **Vancouver Section, AIEE,** elected J. T. Turner, manager, transportation maintenance, B. C. Electric Railway Co., chairman for 1955-56. R. B. Carter is vice-chairman, C. J. Henrikson secretary-treasurer, M. I. G. Bradwell assistant, W. W. Pullinger discussion group chairman.

• **Sacramento Section, AIEE,** organized an electrical construction technical group, inviting electrical contractors, inspectors and others to meet for a better understanding of mutual construction problems in electrical design.

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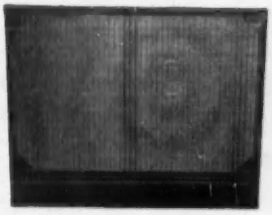

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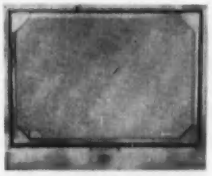
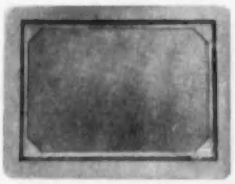
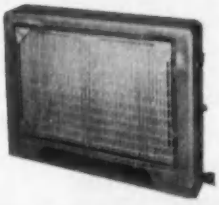


SURFACE MODEL



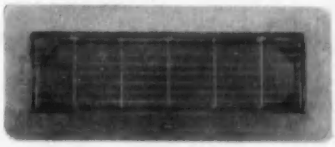
RECESSED MODEL

BATHROOM MODEL



PORTABLE MODEL

PORTABLE MODEL



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5 YEAR guarantee plan • automatic • safe • perfection • glass mounted on rubber cushion • no fire hazard.

1000 watt size heats room approximately 10' x 10'.
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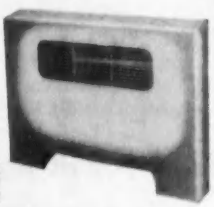
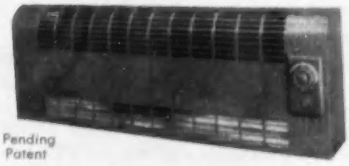


PORTABLE CONVECTION HEATER



BASE BOARD CONVECTOR

Patent Pending
Design Patent

Send coupon for 28 page illustrated bulletin H-78E, with detailed information showing simple method of Heat Calculations so that anyone can do it.

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THE MONTH IN BRIEF

Wishon Construction Contract Let

Pacific Gas and Electric Co. has awarded a contract for construction of its Wishon Dam, a part of the Kings River project. Morrison-Knudsen Inc., Walsh Construction Co. and B. Perini & Sons will build the dam as a joint venture with Morrison-Knudsen as sponsor. Wishon and Helms Dams together will cost $80,000,000 and have a capacity of 274,000 kw.

Fluor Wins Calelectric Contract

A contract to design, engineer and construct a nominally rated 60,000-kw steam-electric generating station for California Electric Power Co. has been awarded to the Fluor Corp., Los Angeles. It is the first of a planned four-unit station. First unit will cost in excess of $9,500,000.

NPPA Sees Hoover Report as Boost

Northwest Public Power Assn. sees in the Hoover Commission recommendations a boost for its own plan for a regional corporation with utility responsibility. The association's bulletin states " . . . the recommendations for regional public electric corporations may prove to be an important turning point." The recommendations referred to call for a regional corporation to develop Columbia River hydroelectric resources.

Ford Grant to Solar Symposium

The Ford Foundation of New York has made a grant of $26,500 to Stanford Research Institute to assist the participation of foreign scientists and engineers in the World Symposium on Applied Solar Energy at Phoenix in November.

Fire Destroys Neah Bay Plant

The steam power generating station of the Neah Bay Light & Power Co., Neah Bay, Wash., was destroyed by fire in July. Loss was estimated at $75,000. A Navy generator provided emergency service.

Idaho Power Tries for Two More Dams

Idaho Power Co. is attempting to get FPC revision of recommendations that only the Brownlee Dam be authorized at this time. The company stated that present and future requirements for electric energy demand Oxbow and Hells Canyon development with Brownlee.

Merger Urged for Hawaiian Utilities

Either a corporation merger or an interchange of facilities between Hilo Electric Light Co. and Kona Light & Power Co. is being recommended by Hawaiian Public Utilities Commission. Commission engineers said the move would equalize rates in the two service areas.

Seattle to Have New Warehouse

Seattle City Council has passed an ordinance authorizing Seattle City Light to proceed with plans for construction of a $1,275,000 warehouse and shop building.

BCE to Build Skyscraper Office

British Columbia Electric Co. has started construction on Vancouver's newest ultramodern skyscraper for a cost of about $6,500,000. John Laing & Son is building the 21-story glass and enameled steel structure. Features include air conditioning, tiny bronze venetian blinds between thermopane glass and room for 1,200 office workers. Company engineers designed the building.

SMUD Asks Construction License

Directors of the Sacramento Municipal Utility District have authorized their staff to apply to the Federal Power Commission for a license to construct three power plants on the upper American River. They would have a combined capacity of 160,000 kw.

Coos-Curry Co-op Project Denied

Coos-Curry Electric Cooperative Inc. has been denied an Oregon Hydroelectric Commission preliminary permit to investigate the site of a project on the Illinois River. The commission said stream flow was not constant enough to justify the investment.

Bonneville Budget Announced

Bonneville Power Administration will have $26,000,000 available for construction of transmission projects in the fiscal year, plus a budget of $6,600,000 for operation and maintenance, according to William Pearl, administrator.

New Hydro Unit Now in Service

California Oregon Power Co. has placed Lemolo No. 1 generating station's 29,000-kw generator in service. North Umpqua River waters impounded by the dam turn the turbine. Lemolo No. 2 is under construction and due for service in 1956. It will be 33,000 kw installed.

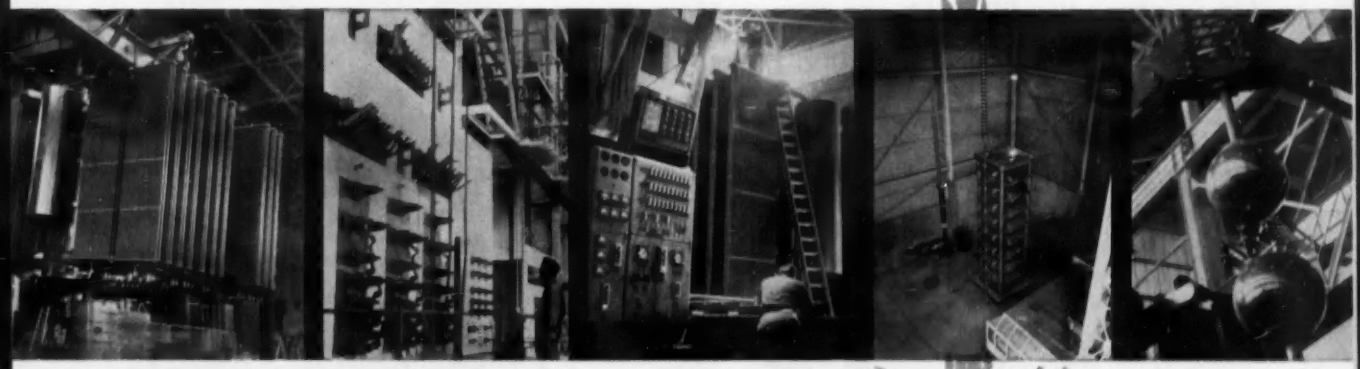
Priest Rapids Agency Proposed

Paul J. Raver, superintendent of Seattle City Light, said the city is studying legal problems involved in the organization of an operating agency, with the view to join Grant County PUD in development of Priest Rapids power project. Seattle has given the PUD a letter of intent to indicate interest in taking about 250,000 kw of the power if price and other factors are satisfactory. Other utilities have given the PUD similar letters.

TESTING

When ordering power transformers—consideration should be given to the performance record of the manufacturer. To assure proper performance, extensive test facilities are necessary. Moloney has constantly expanded their testing facilities to maintain an enviable record of performance and reliability.

MEES-30



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THIS MONTH'S NEWS

TACOMA FACES LITIGATION ON COWLITZ DEVELOPMENTS

Tacoma City Light is facing more litigation in its effort to build the Mayfield and Mossyrock Dams on the Cowlitz River.

The projects are under attack by the Washington fisheries and game departments, and the Cowlitz Indians are suing for $80,000,000 damages.

Because City Light cannot sign a nonlitigation clause in its sale of $15,000,000 of bonds to the New York bond firm of Halsey-Stuart Co., the bonding house has refused to take delivery on the bonds. Dean Barline, Tacoma public utilities director, said the bonds will probably be canceled.

In the meantime, Barline has said that he will recommend that Tacoma sue the departments of fisheries and game if they are successful in getting a permanent injunction against the two projects.

Barline said the damage suit would be based on the loss of about $2,000,000 worth of power annually from the river, losses from the sale of bonds and losses from cancellation of contracts already let for the power development program.

The Cowlitz Indian claims are based on alleged loss of fishing rights, water rights, land and "sacrilegious interference" with ancient burial grounds.

To date, Tacoma has won all court cases contesting its authority to build the dams.

Atomic Fuel Costs Too High Davis Tells Canadian Group

Atomic fuel cycle costs must be lowered before we can expect an economic nuclear power reactor, said W. Kenneth Davis, director, division of reactor development, U. S. Atomic Energy Commission, in speaking before the meeting of the Canadian Electrical Assn., Vancouver, B. C., June 29, 1955.

"It is necessary to get the fuel cycle costs lower than competitive fuel costs inasmuch as this is the only manner in which the higher investment costs of the nuclear power plant itself can be compensated," he said. Davis explained that fuel cycle cost means the total fuel cost, including reprocessing and refining of used fuel elements to achieve economic use of the fissionable material. All such costs must be included to obtain a realistic fuel cost that can be used in determining economics, he pointed out.

A careful distinction was made between dual-purpose reactors (for both power and weapons) and power-only reactors. He said AEC is proceeding in its reactor program on the basis that weapon subsidy must sooner or later cease and for this reason the commission's present philosophy is that atomic power plants should stand on their own economic feet initially. Therefore, Davis said, AEC is lending every encouragement to private industry to help lower fuel cycle costs through research, new processes and new developments.

• **Idaho Power Co.** board of directors has authorized the issue and sale of 15,000 shares of 4% preferred stock to a local underwriter for resale principally in the company's service area. Federal and state approval is necessary.

• **Condemnation action** of the city of Sumner, Wash., against Puget Sound Power & Light Co. distribution facilities within the city has been dismissed in federal court at Tacoma. Similar dismissals are pending in Seattle in actions brought by Enumclaw, Kent and Renton. The petitions were filed in 1951 because the cities were fearful the company's facilities would be condemned by PUDs.

BENNETT THROWS SWITCH ACTIVATING PUNTLEDGE

Premier W. A. C. Bennett of British Columbia threw the switch that activated British Columbia Power Commission's Puntledge River development in June.

The hydroelectric installation is located near Courtenay on Vancouver Island and has a 26,300-kw capability. It is remotely controlled from John Hart development at Campbell River.

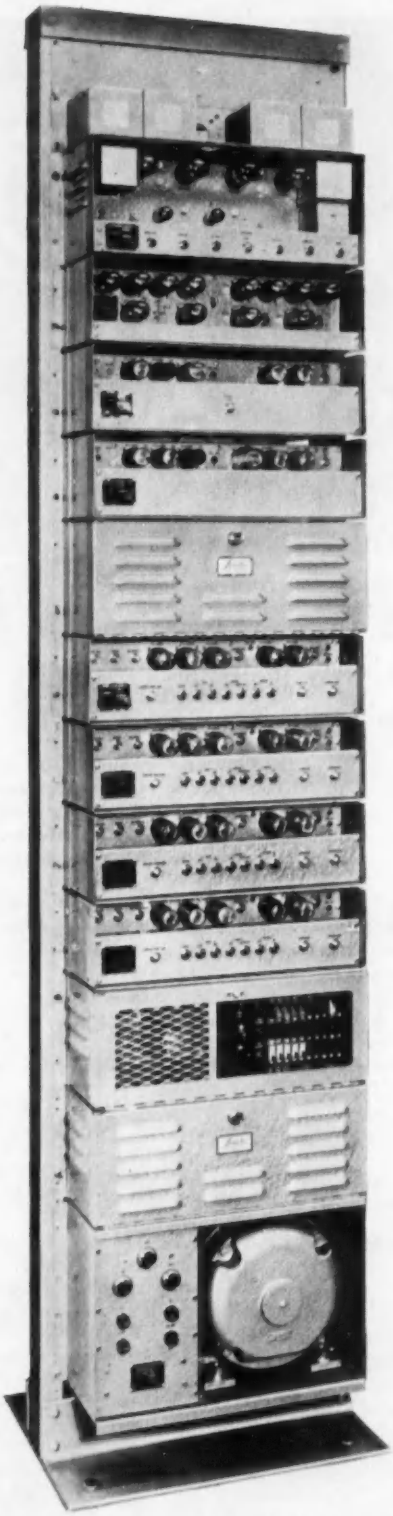
Big Steam Station Planned To Serve Wyoming Utilities

Wyoming may have a steam-electric generating plant costing as much as $50,000,000, according to W. O. Johnston of Pacific Power & Light Co.

He said his company has been working with Reynolds Metals Co. in planning for construction of a $150,000,000 aluminum reduction plant at Lake DeSmet, and a giant generating station would be required to supply power for the mill and Wyoming utilities.

Johnston said the firm contemplates a steam power plant because "Wyoming's hydroelectric potential is almost finished. Future supply must come from steam and it must come by 1958 to meet increased demands."

NEW QUARTERS—After almost three years in temporary quarters following Bakersfield's disastrous earthquake in 1952, Pacific Gas and Electric Co. division offices are now in the company's new building on the corner of H and 20th streets. Building is two-story reinforced concrete, with customer service facilities and an auditorium on the main floor



A 4-channel B60 PL Power Line Carrier terminal assembly with battery operated emergency power supply unit.

Now a 4-Channel "Toll Quality" POWER LINE CARRIER

The new approach to POWER LINE CARRIER

Four "toll quality" telephone circuits operating on one phase of a single 3-phase power line.

Three complete systems (12 channels) operating on a single 3-phase power line . . . with no crosstalk problems.

Less frequency spectrum required per channel. Each channel requires only 4 kc band width for each direction of transmission.

Single side-band suppressed carrier operation. Carrier derived circuits using time-proven toll carrier telephone multiplexing principles.

Coupled to the power line through a single capacitor stack and requiring one single-frequency tuned trap per terminal.

Low radiation interference. Average power output per channel is less than one watt.

Maximum signal-to-noise ratio achieved by the use of compandors.

Dial or ringdown signaling applications. Party line "break-out" operation features available.

Per channel cost of a complete B60PL 4-channel system is considerably less than the cost of other type power line carriers.

. . . . other Lynch Products are:

Multi-channel code transmission equipment with operating frequencies from 255 cps to 29.9 KCS for application on metallic, carrier derived or radio circuits.

V-F multiplexing equipment providing 1 to 48 voice channels for radio circuits.

Standard telephone and telegraph carrier equipment for wire line application.

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DEDICATION CEREMONIES LAUNCH MORRO BAY PLANT

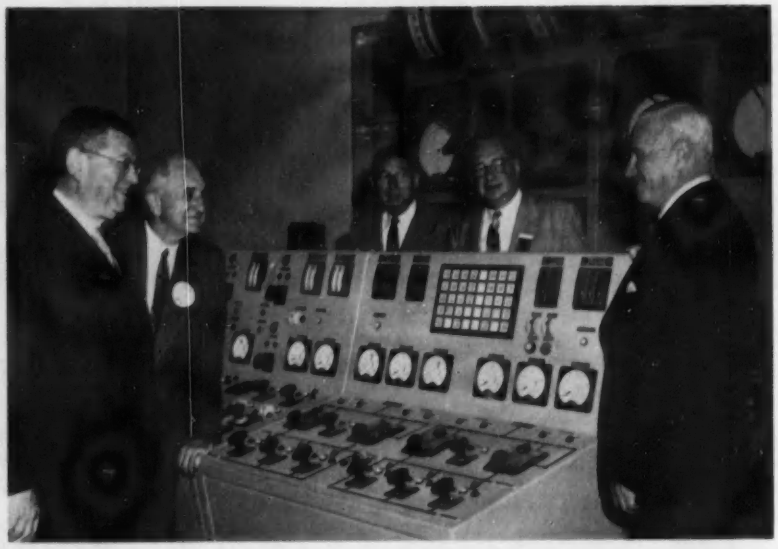
With fitting ceremony the new 300,000-kv, $44,000,000 Morro Bay steam plant of the Pacific Gas and Electric Co. was dedicated on July 8. The company had as its guests for the dedication and lunch local representatives of the press, radio and television, as well as leaders from business and political life.

In accepting delivery of the first unit of the plant from Stephen D. Bechtel, president of the Bechtel Corp., builder of the plant, Norman R. Sutherland, president of PG and E, said: "This is the pattern of financing that has built American industry under our incentive system to a pre-eminence not approached by any other anywhere in the world. Such widespread ownership of the stock of utilities under regulation truly is public ownership in the highest sense."

Bechtel paid tribute to the utility when he said Morro Bay steam plant is one of the finest, most modern and efficient plants of its size and type that exists. "It is a tribute to the vision of PG and E executives and the technical knowledge of its engineering and operating divisions."

A. A. Erhart, state senator, said it was gratifying to the citizens and taxpayers of San Luis Obispo County that PG and E chose the Morro Bay site and that the plant would be a great asset to the school and other special districts and that the pay roll would be a continuing benefit to the local economy.

Mel A. Wood, manager of the San Luis Obispo district, acted as master of ceremonies, introducing for brief remarks, in addition to those mentioned, T. Emmet Ward, manager of the Coast Valleys division, and Walter D. Dreyer, vice-president and chief engineer.



PG and E officials, Stephen Bechtel and State Senator Erhart take part in dedication of Morro Bay steam plant. Left to right are Sutherland, Bechtel, Erhart, Wood and Black

Committee Recommends Money For Three New Hydro Starts

When House and Senate conferees approved fund allocations to start construction of three Pacific Northwest dams, and also for planning of two others, a new round of federal vs partnership battles was forecast by observers.

Construction funds approved were for Ice Harbor, Cougar and Hills Creek Dams, and planning money is for John Day and Green Peter.

Partnership development proposals for both John Day and Green Peter are before Congress, but public power proponents are stating that the appropriations for planning an all-federal construction will defeat the partnership plans.

Ice Harbor Dam, which is slated for a construction start in the 1955-56 fiscal year, still faces opposition from commercial and sports fishing interests in Washington and Oregon. The U. S. Wildlife Service has also opposed the proposal.

Paul B. McKee, president of Pacific Power & Light, declared that "Senate appropriations for Pacific Northwest power development amount to only about one-third of the region's full requirements and actually emphasize the urgent need for partnership action."

Total appropriations recommended amounted to $2,460,000 for the five.

San Diego Gas & Electric Gets Rate Raise Approval

San Diego Gas & Electric Co. has been authorized by the California Public Utilities Commission to increase rates for the first time in 34 years.

A company announcement of the increase states that the rates are designed to produce additional gross revenue of $4,315,000 annually, about $500,000 less than the company's original request.

• **City Light** office employees at Seattle, members of an AFL union, have voted to ask the city council for a $35-a-month wage increase. They will make their demands in conjunction with 21 other AFL unions in the Joint Crafts Council. One of the joint demands is expected to call for institution of social security.

NEW TRANSMISSION LINE STARTS KINGS RIVER JOB

Pacific Gas and Electric Co. has started construction of a transmission line and two substations as an initial step in building the $75,000,000 Kings River hydroelectric project in central California.

A contract for construction of the first unit of the project, Wishon Dam, was recently awarded. See item p. 118.

Construction License Sought For Priest Rapids, Wanapum

The Grant County Public Utility District, Ephrata, Wash., has asked the Federal Power Commission for a license to build Priest Rapids and Wanapum developments on the Columbia River.

According to an FPC report, the two developments would have a combined initial installation of 1,170,000 kw with provisions for future installations at both plants. Total estimated cost of Priest Rapids is $161,000,000 and the Wanapum development is estimated to cost $188,000,000, not including transmission systems.

The combined projects are to be known as Priest Rapids Hydroelectric Development.

• **Largest transformer** ever to be imported to the United States has been delivered to Seattle City Light. Unloading had to be done at the Puget Sound Naval Shipyard, location of the only crane large enough.

There's always a CHANCE for a better connection

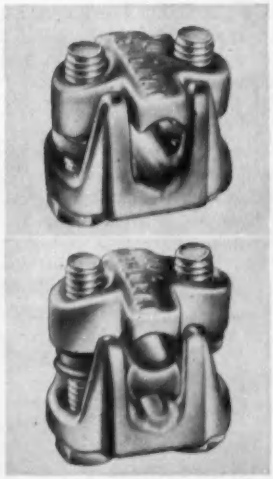
When you're looking for a good connection — don't overlook CHANCE. Because — whatever type connector you want, chances are Chance has it. Everything from parallel groove clamps to solderless terminal lugs. The Chance line represents a wide variety of connectors — all available from a single source — your Chance Distributor.

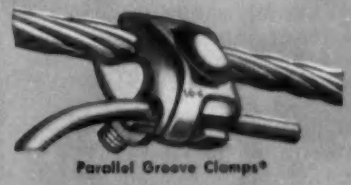
Uni-clamps go on fast—clamp tight—cost less than split-bolts of the same size

A "one-piece" clamp for conductors 1/0 through 1000 MCM. Uni-clamps are easily installed without taking them apart . . . offer a wide contact area plus extra strength for permanently tight contact. Smooth-rounded castings can be readily covered with protective tape. Available for copper, aluminum, or bi-metal connections.

z.l.n. 100 Electrical contact sealing paste

Protects any bi-metal combination against corrosion and improves conductivity. Waterproof, stays plastic. Works in all temperatures. Non-toxic. Non-inflammable.





Parallel Groove Clamps*

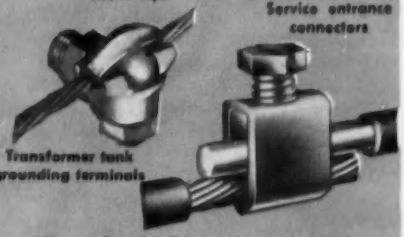
Heavy-duty Parallel Groove Clamps

Uni-Clamps

Split-bolts

Multi-taps

Service entrance connectors



Transformer tank grounding terminals

*Chance Parallel Groove clamps are made in two types: Type "AA" for aluminum to aluminum connections; Type "AGP", fortified cadmium coated, for all conductor combinations. AGP clamps don't require an insert . . . can't be put on wrong. Either side will take copper or aluminum.

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FRONTIER WANTS TO SELL FACILITIES TO REA CO-OPS

The Frontier Power Co. of Trinidad, Colo., has asked the Colorado Public Utilities Commission to approve the sale of the utility for $2,000,000 to two REA cooperatives and the municipal government of Walsenburg.

Plans are for sale of a generating station and other properties to the city of Walsenburg for $750,000; properties in Las Animas and Huerfano Counties to San Isabel Electric Assn., Pueblo, for $1,165,000; and part of a transmission line from Trinidad to Springer, N. M., to Springer Electric Cooperative for $85,000.

Pacific Power Seeks Permit To Study Lewis River Sites

Pacific Power & Light Co. has asked the Federal Power Commission for a preliminary permit to investigate harnessing of four southwest Washington mountain streams for a 74,000-kw hydroelectric development.

The company is also investigating the possibility of developing the Swift Creek site on the Lewis River where it is estimated 250,000 kw can be generated.

Both proposals, the Meadows project and Swift Creek, are on the upper reaches of the river where the company has its Merwin and Yale Dams with a combined capacity of 233,000 kw.

Sacramento UD Will Purchase Firming Power From PG and E

Up to 300,000 kw of firming power will be purchased by Sacramento Municipal Utility District from Pacific Gas and Electric Co., under terms of a contract signed in June.

The power is for SMUD's Upper American River Project and general supplemental use, and does away with a need for the district to build a steam plant at this time. SMUD officials report that the resulting saving to the district amounts to about $1,900,000 over the first eight years during which the power from PG and E would be fully absorbed.

• **Public Service Co. of Colorado** has boosted its common stock dividend rate from 40c to 45c quarterly, effective with payments Aug. 1 on stock of record July 13. President John E. Loiseau said the company plans to issue 303,010 additional shares of common stock. About 27,546 of the shares will be offered to employees.

The Mother Lode's first generating plant has been placed on permanent display at Angels Camp, Calif. The 15-ton Pelton wheel and generator were used in the 1890s by the Utica Mining Co. An 18-mule team carried it to its first location, a crew of volunteers its second

Alaska Association Formed To Develop Central Areas

The Central Alaska Power Assn. has been incorporated at Anchorage to further hydroelectric development of the area.

Charter members of the association are Homer Electric, Matanuska Electric, Chugach Electric and Kenai Lake Electric associations, serving some 12,000 customers.

First project of the association is expected to be the hydroelectric development of Cooper Lake. The Kenai Lake unit has requested a $500,000 REA loan to start the project, which would have an installed capacity of 12,200 kw.

• **Pend Oreille PUD** of Newport, Wash., has placed the second of three 16,667-kw generators in production at its Box Canyon Dam on the Pend Oreille River near Ione.

• **Montana Power Co.** has started construction of a 69-kv transmission line from Whatley Junction to the Glasgow Air Force Base, according to Ray M. Ball, chief engineer. The company was given the job of supplying air base electricity on the basis of competitive bidding.

• **An intensive educational campaign** to reduce injuries and deaths from contact with high-voltage lines is being launched by the Division of Industrial Safety and Pacific Gas and Electric Co. Three safety pamphlets are the first materials made available in the campaign.

Bids and Contracts

• **Seattle City Light** has awarded a $500,000 contract for construction and improvement at its Skagit River power generation area. Included in the contract is installation of a turbine and auxiliary equipment at the Ross power house.

• **Vancouver Iron Works Ltd.** has received a contract for two 71,000-kw turbines from British Columbia Electric Co. The turbines, costing $744,000, will be built by Canadian Westinghouse Ltd. and are to go into BCE's Cheakamus River hydroelectric plant. Canadian Westinghouse has said Cheakamus will be "the largest remotely controlled hydroelectric plant in the world."

• **Service Hardware Co.**, Tacoma, was low bidder to do core drilling, pump testing and churn drilling for Chelan County PUD, Wenatchee, Wash., at the PUD's Rocky Beach site on the Columbia River. Bid was $61,700.

• **Continental Co.**, Dayton, Ohio, has been awarded a $373,010 contract by Bonneville Power Administration for construction of 21 miles of 345-kv transmission line from Chief Joseph Dam to the Puget Sound load centers.

• **General Electric Co.** will supply equipment to Tacoma City Light after competing with two foreign firms. G-E's bid was higher at $171,588, but the U. S. company was able to promise delivery within 360 days. Pacific Oerlikon Co., Tacoma, and Westinghouse Electric Corp. will supply accessories for the transformer.

• **General Electric Co.** will furnish two steam turbine generators for the Scattergood steam plant of Los Angeles Department of Water & Power for $7,725,976. The contract is subject to approval by the city council.

• **Minneapolis-Honeywell Regulator** Co. was awarded a contract to build an automatic control system for the Ogden, Utah, $750,000 water filtration plant.

• **The Elliott** Co. of Jeanette, Pa., submitted the lowest bids received by the Tacoma Board of Contracts and Awards for generators required on the city's Cowlitz hydroelectric project. **S. Morgan Smith** Co. of York, Pa., figured low for turbines. Elliott asked $2,048,665 for three generators and $2,691,925 for four. S. Morgan Smith Co. bid $1,308,105 for three turbines and $1,701,870 for four.

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This 2⅛" x 1⅝" all-purpose electrical raceway goes up fast—just the thing for quick, easy industrial and commercial wiring and rewiring jobs requiring plenty of outlets. Surfaceduct has two-piece base and capping with unique bridge that locks capping securely in place, yet permits easy removal for future service additions. Lay in wires, snap on the capping. No fishing required. Simple fittings for all job requirements. Device covers to accmomodate all standard devices.

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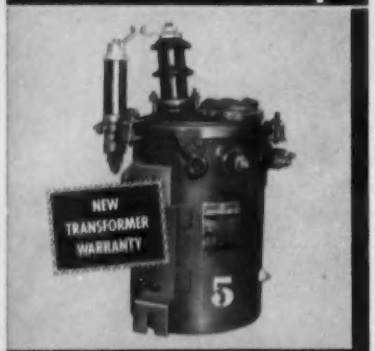

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There's lots of life in your old distribution transformers yet! Just let your local G-E Service Shop replace the old cores and coils with new factory-built units of higher kva capacity. Your transformers are returned good as new. There are 31 G-E Service Shops throughout the country—one near you. 431-33

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NEWS ABOUT PEOPLE

Lucking Heads Arizona Firm As Sargent Goes to New Post

With the resignation of Henry B. Sargent as president of Arizona Public Service Co. June 29 came the announcement that Walter T. Lucking, vice-president in charge of operations, was selected by the board of directors to head up the company.

Sargent is now president of American & Foreign Power Co., which operates in 11 Central and South American countries, with headquarters in New York City, and of Ebasco International Corp., a subsidiary.

Claire Titus was elected a vice-president and will continue as assistant to the president.

Other changes approved by the board: John L. Liecty, treasurer, and A. H. Forman Jr., executive vice-president, were elected directors. Frank L. Snell was elected chairman of the executive committee of the board.

• **Albert J. Hamilton,** director of power economics for Sacramento Municipal Utility District, will take a leave of absence from the district to serve as economics consultant to a large hydroelectric development in southern Brazil.

• **Silas R. Overholser,** resident engineer of the Corps of Engineers at the Lookout Point project on Oregon's Willamette River basin, has been granted a year's leave by the corps for employment by Tudor Engineering Co., San Francisco, as resident engineer for the Tri-Dam project near Sonora, Calif.

• **Supervisory staff** for construction of the Cowlitz River hydroelectric project has been announced by Henry A. Cole, City Light superintendent at Tacoma. **Carl F. Pflugmacher** is project office engineer, **Hal W. Birkeland** is head civil engineer, **Arthur D. Francis,** chief electrical engineer, **Harry M. Manning,** assistant electrical engineer, **Harold R. Lanning,** head mechanical engineer, **Louis E. Fox,** assistant mechanical engineer, **John C. Mundt,** resident engineer for Mayfield Dam, **John C. Richard** and **Donald M. McLaren,** assistant resident engineers, **Emil A. Shabatura** and **Henry F. Smith,** assistant civil engineers, and **Verne W. Jenkins,** chief of surveys.

Lucking
New president, Arizona Public Service

Sargent
Heading American & Foreign Power Co.

Titus
Promoted to Arizona vice-presidency

You Get EXTRA Protection with

DEEP... DEEP GROUNDING

Insure protection of your expensive equipment this low-cost, efficient way

Drive down to moist soil that gives lower earth to rod resistance. Actual experience shows a few dollars invested in deep grounding has saved thousands of dollars in overhead burn-outs.

- BLACKBURN Sectional Rods have uniform coating of highly conductive corrosive-resistant copper, molecularly bonded to rigid steel core.
- Driving studs and coupling interchangeable with all standard sectional ground rods.
- Available through Electrical Distributors.

BLACKBURN Sectional COPPER BONDED GROUND RODS

JASPER BLACKBURN CORPORATION
35 Madison Street • St. Louis 6, Missouri
Phone MAin 1-2821

Distributed on the West Coast by **KORTICK MFG. CO.**

Selling electrical equipment for TRANSMISSION & DISTRIBUTION?

New transmission lines in the 11 Western States in 1955 will total 2,614 miles—up 17.5% from last year!

New distribution for 1955 will total 6,924 miles—up 9.5% from last year.

In ELECTRICAL WEST your advertising sales messages get to the most power system engineers, operators and management executives in the West. 6,219 utility subscribers—double the number you get if you use only national publications!

Selling electrical WIRING DEVICES *or appliances?*

More than 25% of all new houses are built in the 11 Western States. For 1955, this means about 300,000 homes valued at $2.5 billion.

In ELECTRICAL WEST your advertising sales messages will reach all of the leading electrical contractors and electrical wholesalers in the West. 1,756 subscribers in these groups.

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ELECTRICAL WEST deserves serious consideration for every electrical equipment advertising schedule. Take advantage of penetrating coverage of a huge market that sprawls over 40% of the land area of the U. S.

ELECTRICAL WEST

68 POST STREET, SAN FRANCISCO 4, CALIFORNIA

A McGraw-Hill Publication

Three Promoted at PG and E In Top-Executive Changes

Two Pacific Gas and Electric Co. executives were promoted to vice-presidencies and a third was appointed manager of advertising and publicity for the company.

Robert R. Gros, former manager of advertising and publicity, is now a vice-president with responsibility for informational activities and special assignments by President Norman Sutherland. New vice-president and assistant general manager of the company is Shermer L. Sibley.

Succeeding Gros as advertising and publicity head is James McCollum, who has been the company's news bureau chief since 1946.

Dispatching Department Men Promoted at Pacific Power

A series of personnel changes is reported from Portland, where J. T. Holbrook has been named chief load dispatcher for Pacific Power & Light Co. He succeeds George Nostrant, who is now assistant general superintendent.

Claude V. Winterscheid takes Holbrook's former position as district power superintendent at Yakima and Vane R. Wilder is the new system load dispatcher at Bend, Ore.

• **Alfred J. Johnson** has been elected chairman of the Tacoma Public Utilities Board to succeed **Thomas W. Anderson,** who continues as a board member. **Warren L. Lagerquist** takes over Johnson's former position as vice-chairman and **Ralph L. Johnson** succeeds Lagerquist as secretary.

• **O. F. Wisemore** will be in charge of the Chelan PUD offices recently purchased by Chelan County PUD from Washington Water Power Co. **V. A. Beckman** will remain with WWP. Operation of Chelan Dam will be under the supervision of **Howard Elmore.**

• **A. E. Grauer,** president of British Columbia Electric Co., has been appointed a member of a Royal commission to inquire into the economic future of Canada.

• **Henry Beistel,** Eugene, Ore., city treasurer - recorder, has been designated deputy administrator of Eugene Water & Electric Dept. Other changes took place after the retirement of **Norman Johnson,** superintendent. **Kenneth Rinard** succeeds Johnson, **Winston Berkley** is new assistant superintendent and **Benjamin Barnts** is now in charge of the filtration plant.

Sibley

Gros

• **Stuart Foster,** Yakima attorney, has been appointed to a six-year term on the Washington State Power Commission to succeed the late **Roy H. Skill.**

• **Ralph C. Horton** was appointed chairman of the Colorado Public Utilities Commission at the expiration of the term of **Joseph W. Hawley** July 1. Hawley remains a member of the commission.

• **Arch Balchin,** a retired district manager for the Pacific Gas and Electric Co., has been appointed to the Monterey County board of supervisors by Gov. Goodwin J. Knight.

• **George W. Poulsen,** Salt Lake City, has been named president of the Intermountain Institute of Consulting Engineers, an organization of mechanical, electrical and civil engineers in the region.

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- Carma Manufacturing Co.
- Cole Electric Co.
- Lapp Insulator Co.
- P-W Industries, Inc.
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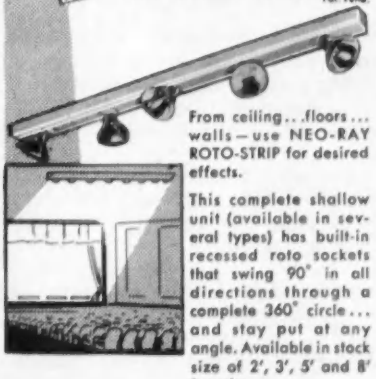
NEO-RAY ROTO-STRIP
Pat. Pend.



From ceiling...floors... walls—use NEO-RAY ROTO-STRIP for desired effects.

This complete shallow unit (available in several types) has built-in recessed roto sockets that swing 90° in all directions through a complete 360° circle... and stay put at any angle. Available in stock size of 2', 3', 5' and 8' lengths.

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Idaho
Richard English
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Portland, Ore.

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TOUGH For long life

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For new construction and maintenance —Everstick Anchors speed up work and provide dependable anchorage on all types of jobs. Made of resilient, rust resistant malleable iron. The toughest anchors made. Write for bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

Deaths

• **J. Scott Milne,** president, International Brotherhood of Electrical Workers, aged 57, died in Portland July 20 of a heart attack. He had only been president since April 1954, succeeding the late Dan W. Tracy who died early this year. Mr. Milne was probably the organizer of most of the West's utilities into this AFL union. Starting as a lineman for Portland General Electric Co. in August 1918, he became business agent in 1923, secretary-treasurer in 1929 and then international representative and vice-president of District 9, San Francisco, from 1936 to 1947. When Tracy was re-elected president at the San Francisco convention, he became national secretary-treasurer.

• **Edwin M. McLaughlin,** 59, chief electrical inspector of Richmond, Calif., died July 6 after a long illness. He had been inspector for 27 years and active in the association's meetings.

• **Richard H. Jones,** 66, vice-president and treasurer, Utah Power & Light Co., died June 29 of a heart attack at his home in Salt Lake City. A native of Powell, S. D., he was first employed at Salt Lake City on the Oregon Short Line R.R. (Union Pacific) as a bookkeeper. He came up through the ranks at Utah Power when that firm acquired Utah Light & Traction Co., an affiliate of Union Pacific. He was named vice-president and treasurer in 1944 and a director in 1946.

• **Arthur E. Ormsby,** 53, manager of the Calgary, Alberta, district of the Canadian General Electric Co., died June 28.

• **Burton Reece Cole,** Fresno manager for Graybar since 1949, died recently at the age of 52. He was a Stanford graduate, and had served as a Lt. Colonel in the Signal Corps in World War II.

• **Arthur R. Fryklund,** 61, electrical engineer who retired in 1953 after 45 years with the Graybar Electric Co., died in Sacramento June 20. He was a former assistant manager for the company in San Francisco and was manager at Sacramento at the time of his retirement.

• **James H. Bright,** 65, a civil engineer employed by Sacramento Region II of the Bureau of Reclamation, died in Sacramento June 17. His latest work was on the bureau's Folsom power plant on the American River.

NOTES ON THE TRADE

• **Leadlight Fixture Co.,** 800 100th Ave., Oakland, Calif., is building a new factory to replace the one destroyed by fire last year. In the meantime, the company has been operating from temporary quarters and has expanded to handle the highest volume of sales in its history, reports President Milton Kosman.

• **North State Electric Supply** Co. is in new quarters at 1264 Folsom St., San Francisco 3. Owners **John Salonen** and **Sil Chaippari** started the business 15 months ago and have expanded from the original 3,300 sq ft to about 9,500 sq ft of space for stocks. An in-out drive-in service for Bay Area contractors is a new feature.

• **Willard C. Hird** has been named assistant to the manager of the Pacific Coast region of the Westinghouse Lamp Division, with headquarters at Emeryville, Calif.

• **Westinghouse Electric** Corp. announces that **Edwin C. Martinez** has been appointed an area sales manager of the apparatus division with offices at 600 St. Paul Ave., Los Angeles. He joined Westinghouse in San Francisco in 1943.

• **Ray G. Galenbeck,** salesman for Anaconda Wire & Cable Co., Seattle, is 1955-56 secretary of the Electric Club of Washington.

• **James L. Kearns** Co., engineering representative for manufacturers of instruments, meters, counters and controls, has moved into its own building at 6055 N. E. Glisan St., Portland.

• **Electrical Facilities** Inc., Oakland, has changed its name to Knopp Inc., to have the company name and product name similar.

• **Rome Cable** Corp. was featured on the "Success Story" program of KTTV, Los Angeles, in July. **Glenn Koger,** vice-president and general manager, explained quality control and precision manufacture of electrical conduit. The program is sponsored by Richfield Oil Co.

• **Barney De Ramus,** 125 S. Santa Fe, Los Angeles, is now manufacturing and assembling Imperial Lighting equipment for the West Coast market. He is continuing as Imperial's sales agent.

Eardley

• **Doral Eardley** is new Fresno manager for Graybar Electric Co. Inc. He has been with Graybar since 1937, serving as office salesman at Salt Lake City, supply salesman there, lamp sales at San Francisco, and since 1948 as salesman covering major and industrial accounts.

• **Ross L. Mahon** is now an engineering sales consultant with headquarters at Rt. 2, Box 107, Carmel, Calif. He was formerly a vice-president of Pelton Water Wheel Co. and retired from the position of Western district manager for S. Morgan Smith Co.

• **R. M. Dorman,** formerly manager of industrial relations for Bechtel Corp., is now manager of public relations, according to an announcement by the company's management.

• **Globe American** Corp. has named **Forest O. Conklin Jr.,** as Western division sales manager. He resides in West Covina, Calif., and attended both USC and UCLA.

• **Standard Wire & Cable** Co., 3440 Overland Ave., Los Angeles, is now the Washington, Oregon and California sales representative for the Garfield Wire Division of Overlakes Corp. A local stock will be maintained.

• **Lloyd J. Deris** has been promoted from works manager to general manager of Mullenbach Division of Electric Machinery Mfg. Co., a subsidiary of Worthington Corp.

• **Alpha Wire** Corp. announces the appointment of Leonard L. Minthorne Co., 7521 N. E. Glisan Ave., Portland 16, Ore., as manufacturer's representative for the territory of Washington, Oregon and western Idaho.

NEW 7½-acre plant (under one roof) to provide faster service for those who use...

WIRE BY PHELPS DODGE

Huge wire mill-warehouse offers immediate delivery service on wire and cable!

Phelps Dodge Copper Products Corporation's new plant at Yonkers, N. Y., covers seven and a half acres, is equipped with the latest facilities to service its customers.

A coordinated production and warehousing system in this plant enables Phelps Dodge to maintain stocks of every kind of building wire and cable ready for immediate filling of customer orders. Ten truck bays and a seven-car undercover freight siding will eliminate the usual loading delays, help speed shipments to their destinations. This new and exclusive system is an example of the careful attention Phelps Dodge has given to providing the finest service for its customers at this new plant.

On every wiring job, large or small, where top quality materials, expert workmanship and experienced "know-how" are called for, *it pays to rely on Phelps Dodge and your Phelps Dodge* distributor!

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Roanoke, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

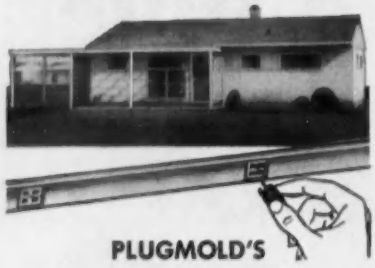
Chicago Contractor selects **Plugmold** for 2,250 low cost homes

Electrical Contractor C. W. ABRELL* says:

"To date we have completed the wiring in the first 130 houses of the Markham project. Wiremold's new product, Snapicoil, installs easily and our men like working with it.

Using Plugmold wiring we can give the customer a high quality job which in turn qualifies us for a better profit."

*President
Edward P. Allison Co., Inc.
Chicago, Illinois



PLUGMOLD'S
More-for-the-Money Value
HELPS SELL HOMES!

Builder Melvin B. Fisher finds Plugmold is "a plus value which can, and often does mean a sale" in his new Markham, Illinois project, where it is being used to provide duplex electrical outlets every 5 feet in every room of the 2,250 homes. The electrical contractor selected Plugmold for these six-room $11,990 homes because it greatly simplifies installation and provides twice the usual number of outlets.

Our Engineering Department will gladly help you with specifications for Plugmold wiring. For more information, write to Dept. M8

THE WIREMOLD COMPANY
Hartford 10, Connecticut

• **Hyde Sales Co.** New Mexico offices are now at 2220 Utah St., N. E., Albuquerque. Area served from there includes Arizona, New Mexico and El Paso.

• **B. R. Lind,** former Seattle and San Francisco representative of Graybar Electric Co. Inc., has been promoted to branch manager at Madison, Wis. He is a native of Chelan, Wash., and attended the University of California.

• **Elgin National Watch Co.** became a manufacturer of high-precision electrical switches with the purchase of **Advance Electric & Relay Co.,** Burbank, Calif.

• **J. F. Ogden** is new consumer products manager of Westinghouse Electric Supply Co. for the northwest Oregon and southwest Washington area. He was formerly northern California sales manager.

• **W. Lyle Sturtevant** has been appointed head of the electrical conductor distributor program of Kaiser Aluminum & Chemical Sales Inc., in addition to his present responsibilities as the company's REA specialist. He will be assisted by **W. A. Horning,** newly appointed electrical conductor distributor specialist.

• **General Electric Co.** graduate scholarships have been awarded to **Joel E. Gordon,** Berkeley; **Ronald W. Brosemer,** Oakland; **Charles P. Nash,** Sacramento, and **Dale E. Tenny,** Billings, Mont. The four Westerners were among 34 top students across the nation to win the scholarships.

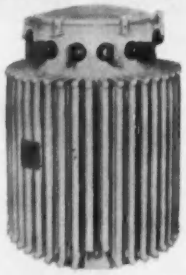
• **Minneapolis-Honeywell Regulator Co.** has added **Raymond E. Sawyer** and **Thomas B. Kendall** to the Los Angeles sales force, and **Harry A. Fuller** and **William R. Georg** to the Los Angeles field service group.

• **A new movie** dealing with peacetime use of atomic energy and starring Fred MacMurray is now offered for loan or sale by Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa. Title is *A Dawn's Early Light.*

• **Bristol Co.** of Waterbury, Conn., has named D. J. Yates as West Coast field representative. He will headquarter at 2181 E. 25th St., Los Angeles.

• **C. E. Ingalls Co.** is the new representative of Delta-Star Electric Division, H. K. Porter Co. Inc., in San Francisco.

MEET THE NEW
167 KVA
Featherweight
PENNSYLVANIA POLE STAR DISTRIBUTION TRANSFORMER



★ Will replace any single phase 75 or 100 Kva Pole-mounted Transformer to provide 67% to 123% more capacity.
★ Weighs less than 1500 pounds
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Established manufacturers' agent with Chicago warehouse, now representing wire, cable and device manufacturers in mid-west desires additional line of quality products for electrical wholesalers. Write Box 286 —ELECTRICAL WEST, 68 Post St., San Francisco 4, Calif.

It Pays to Advertise in Electrical West

The epic story of population and industry migration Westward rivals the gold rush migrations of 1849-50. Added to the already rich and stable market afforded by the region, they make the West the nation's preeminent market for electrical equipment, materials and appliances. These are the factors that warrant special SALES and ADVERTISING attention to this market.

• **Four Wheel Drive Auto Co.** announces that Kimball Equipment Co., 222 W. 17th South, Salt Lake City, is the new Utah sales, parts and service dealer.

• **Proto Tools,** Los Angeles, has consolidated 15 sales zones into seven regions with a manager for each. **H. W. Oetjen is** Western region manager and headquarters at Los Angeles. Another change is the promotion of **Louis Greenfield** from assistant sales manager to product manager.

• **Edward M. Ellis,** manager of General Electric Co.'s Pacific Southwest apparatus sales district retired June 1 after 44 years service. He was honored at a banquet in Los Angeles, with about 200 G-E employees attending.

• **The Anaconda Co.** is the new name of Anaconda Copper Mining Co. A widened scope of operations embracing many activities besides copper mining prompted the change in name.

• **Robert W. Goode** is new works manager for Peterson Engineering Co., Santa Clara, Calif. Goode is a native of the San Francisco area and former general foreman of the BE-GE Mfg. Co., Gilroy, Calif.

• **Muth-Richards Co.** is now in its own building at 1804 Bush, Seattle.

• **Robertshaw - Fulton Controls** has opened a new warehouse at 3101 Imperial Highway, Lynwood, Calif. The unit will house West Coast supplies of the Fulton Sylphon and Bridgeport Thermostat divisions of the company.

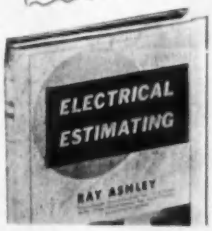
• **Westinghouse Electric Supply Co.** has named **Thomas E. Dougherty** to the position of advertising manager at Vernon, Calif. Dougherty is a native of Montrose, Colo., and joined Westinghouse in 1954 after extensive sales education work in Europe.

• **Hall-Scott Motors Co.,** Berkeley, Calif., has acquired the firm of Bardwell & McAlister, electronics equipment research and production.

• **J. E. Hachten Co.,** San Gabriel, Calif., has been named West Coast representative for Condenser Products Co., division of New Haven Clock & Watch Co.

• **R. Frank Pinson** is new superintendent of Hubbard & Co.'s Oakland, Calif., plant succeeding Edward H. Grob, who recently retired after 49 years service. Pinson has been with the company since 1925.

ELECTRICAL CONTRACTORS AND ESTIMATORS



This book shows

HOW TO ESTIMATE THE COST OF ANY ELECTRICAL JOB

IN this manual you'll find all the information you need to estimate the cost of an electrical construction job . . . quickly and accurately. It is packed with time-saving methods, tips and guides that help you streamline your estimating procedures—give you the know-how that means safer and more dependable bids. It covers everything from the selection and training of electrical estimators and the proper use of estimating tools . . . to the cost of preliminary estimates and the preparation of final bid sheets. You'll find, too, helpful information on the design and use of estimating forms, the importance of weights and measures, and meeting special estimating requirements.

Scores of sample estimates of actual construction costs make this book a "must" for anyone who wants at his fingertips the best in professional electrical estimating.

ELECTRICAL ESTIMATING

By RAY ASHLEY

Research Engineer, Electrical Contractors' Assn., City of Chicago; Member, Chicago Electrical Estimators' Assn.; Electrical Engineering and Estimating Consultant

307 pages, 6 x 9, illustrated, $8.00

REFLECTING 25 years of experience in all branches of the electrical-contracting industry, this book gives information of value to the contractor, estimator, and engineer who must solve daily complex problems of estimating, appraisal, cost accounting, job scheduling, or supervision. Clear explanations, plus sample estimates and guides, show you how to handle lighting and power branch wiring—distribution equipment—auxiliary, summary, and final bid sheets—overhead and markups—checking estimates—and estimating special projects and residential wiring. Time studies and preparation of labor cost units, as well as studying plans and specifications are examined in detail.

Covers . . .

- estimating forms
- estimating tools and their proper use
- studying plans and specifications
- taking off quantities
- listing and checking material quantities
- checking completed estimates
- preparation of final bid sheets
- and many other practical subjects

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PROFILES

Pictured are two men who were recently promoted by Southern Nevada Power Co. At left is William P. Bedgood, new executive assistant to the vice-president and operating manager. With him is Merton H. Diels who is new treasurer of the company. Bedgood is a native of the Channel Islands who moved to San Francisco at the age of two; began his work career 50 years ago as an apprentice electrician with a railway, then went to PG and E for 45 years. Diels has a background as an accountant and controller

L. A. McCants, Ebasco construction supervisor, left, officially closes out his duties at Arizona Public Service company's new 200,000-kw Saguaro plant by presenting the key to Arizona's George Groh and Ed Lodge. Plant construction began in the fall of 1952

One of the pleasant social occasions at the recent EEI convention in Los Angeles was a cocktail and dinner party given by J. R. (Pat) Murphy, Northwest district manager, General Electric Co., for utility men and their wives from the Northwest. In the photo from left to right are: J. F. Gogins, G-E, Portland; H. C. Glaze, G-E, Spokane; Kinsey Robinson, Washington Water Power Co.; C. C. Walker, G-E, San Francisco; Guy Suits, G-E, Schenectady; Murphy, Seattle; C. H. Linder, G-E, Schenectady; D. R. McClung, Pacific Power & Light Co.; and J. H. Polhemus of the Portland General Electrc Co.

Pays off at the take-off!

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Here's a complete "system" for making trouble-free mid-span take-offs in less time. Everything needed is made by Kearney . . . to Kearney quality standards . . . field-tested to help your crews do a better job every time.

SPAN CLAMP provides a practical and dependable way of dead-ending service wires to the bare neutral of the secondary in mid span. It is used in combination with the . . .

WEDGE-TITE CLAMP . . . easy to use and dependable because it is self-tightening. Constructed of corrosion-resistant materials throughout and plated for use on all types of conductors.

SQUEEZON CONNECTORS embody the newest developments in easy-to-install, reliable compression connectors. May be used for bi-metallic connections.

SERVICE CABLE TIES are made of soft aluminum. May be easily applied with finger pressure to secure insulated wires to the bare neutral.

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Inside Houston's new Texas National Bank Building...

ARCHITECT: *Kenneth Franzheim*

ENGINEERS: *Howard & Johnson*

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...they bank on 40,000 SCOTCHLOK wire connectors!

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480 line-to-line voltage calls for top-quality connections, top-quality insulation. That's why Howard P. Foley, electrical contractor for the new Texas National Bank Building in Houston, chose "SCOTCHLOK" connectors and "SCOTCH" Brand No. 33 Plastic Electrical Tape.

"SCOTCHLOK" is the tightest-gripping wire connector on the market. It never shakes loose. "SCOTCH" 33 is the original, and still finest, plastic electrical tape. Try this top team on *your* next wiring job! Write 3M, Dept. BU-85, St. Paul 6, Minn.

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Meet the Wilsons who set up housekeeping in Napa in 1935

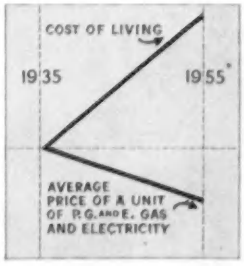
20 YEARS AGO—when Earle and Dorothy Wilson were married, they had just five appliances: range, water heater, iron, toaster and waffle iron.

TODAY—their original home, enlarged and modernized, has 27 more appliances, including a gas furnace, refrigerator, washer, dryer, television set, 5 radios, vacuum cleaner, garbage disposer, 2 electric razors, coffee-maker, sandwich grill, mixer, deep fat fryer, sewing machine, vibrator, sun lamp, 3 electric clocks and a well-equipped work shop.

Today they buy $15 worth of gas and electricity for $10

...for the average unit cost is less than in '35

Most Californians — like the Wilsons — have added gas and electric servants over the years. The average California home uses three times as much gas and electricity as twenty years ago. Naturally, your total bill is higher, but the average price of a kilowatt hour of electricity and a cubic foot of gas is about one-third less than in 1935 — thanks to mass production economies.



As a result, the Wilson's gas and electric bill in a recent month was $10.79. In 1935 the same amount would have cost $15.55. And this same saving, you will find, will most likely apply to your own gas and electric bill.

Can you think of any other prices that are actually lower today than they were 20 years ago? *No wonder we say . . .*

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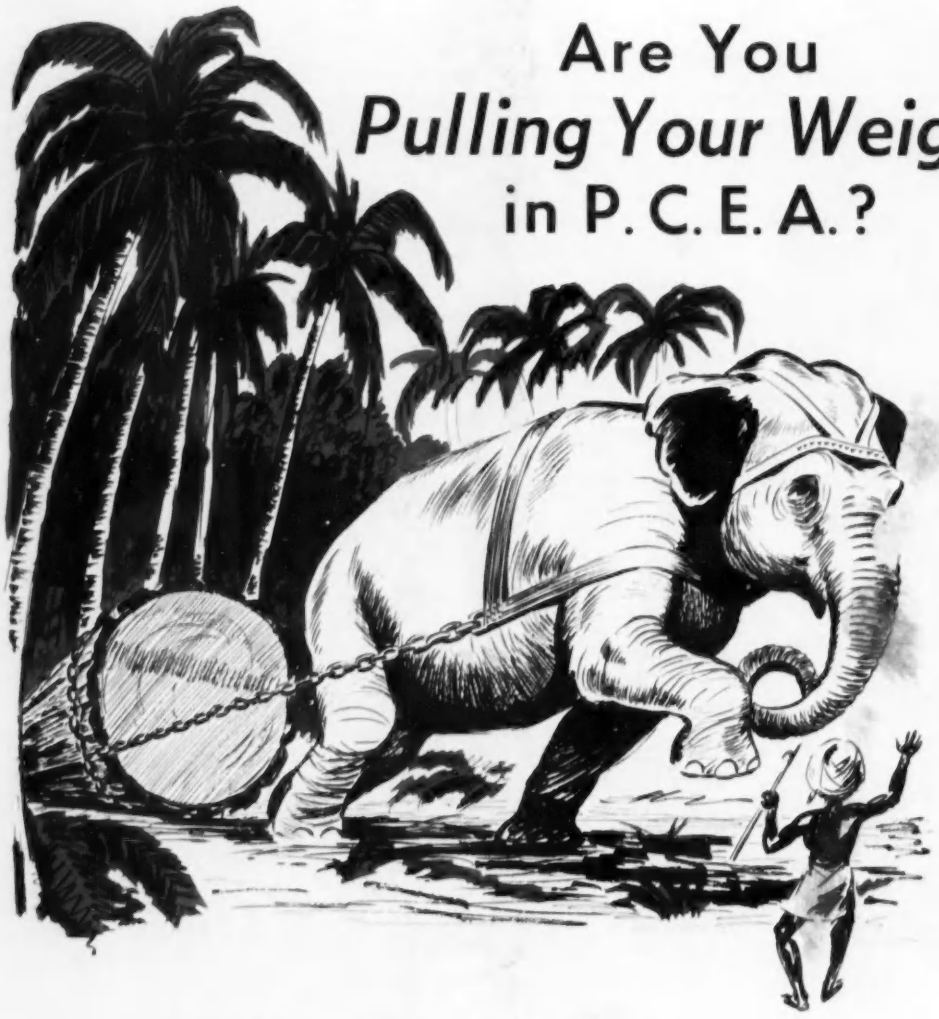

PCEA is not an organization just for "joiners" . . . far from it! We're a "do something" outfit with a proud 38 year record of solid accomplishment in helping to improve the electric industry's service to our customers.

By working together for the benefit of each other and the betterment of the industry as a whole, our members . . . not just a few of them, but an overwhelming majority . . . have carried out hundreds of projects of benefit to all.

As a person who wants to do something for your own good and the good of the electric industry, make up your r ind today to take a more active part in PCEA activities. Contact either of our two offices for full information.

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